Call-A.P.P.L.E.™

Volume V, Number 10 October 1982 $2.50 ($3.00 Canada, £1.75 UK.)

A IS FOR APPLE:
Envelope Addresser

Page 9

A Call —A.P.P.L.E. TECHNIQUE:
Local Variables In Applesoft

Page 13

DOS FEATURE SECTION
A Call —A.P.P.L.E. TECHNIQUE:
DOS/Pascal Bilingual Disks

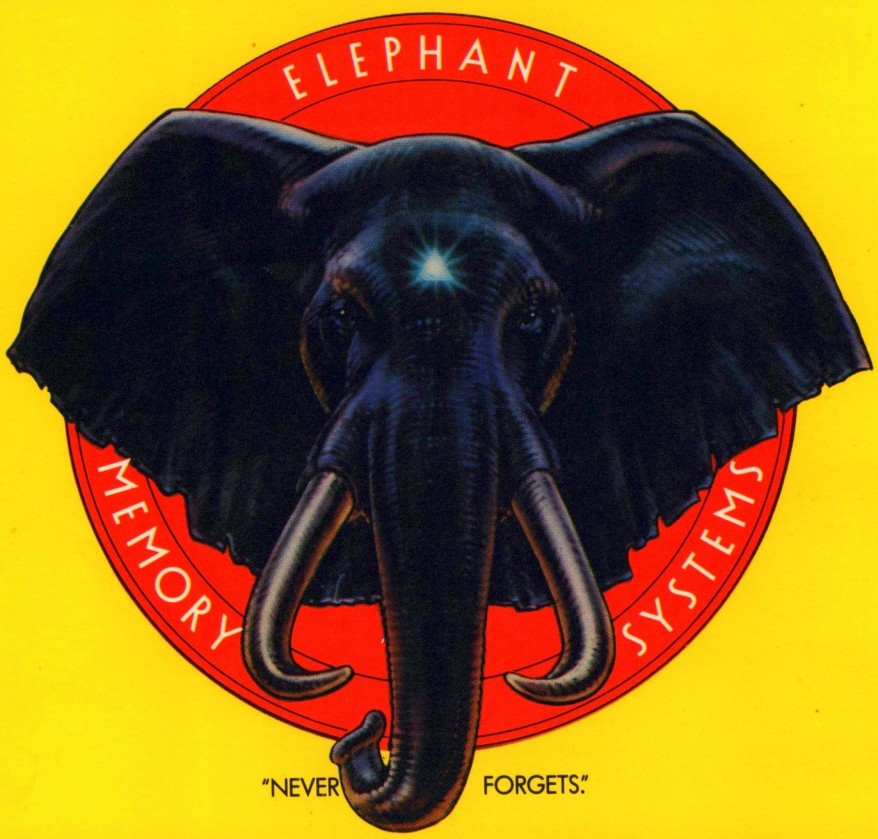
Page 17

A Call —A.P.P.L.E. REVIEW:
Selection of a Disk System Part 2

Page 23

Apple PugetSound Program Library Exchange

REMEMBER:



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7:30 PM, Tuesday, October 19, 1982

Red Lion Inn/Sea-Tac
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Speaker to be announced

7:30 PM, Tuesday, November 16, 1982

Empire Electronics
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Speaker to be announced

7:30 PM, Tuesday, December 21, 1982

Speaker and location to be announced

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Institutional memberships are now available. Contact General Office for details.

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A.P.P.L.E. consultants will be found on page 87 of this issue.

Call-A.P.P.L.E.™

Volume 5, Number 10 October 1982/Menu Val J. Golding, Editor

ENTRÉES

9 A IS FOR APPLE:
Envelope Addresser
Ralph Swerdlow, M.D./Call —A.P.P.L.E. Staff Writer

13 A CALL—A.P.P.L.E. TECHNIQUE:
Local Variables in Applesoft
Charles Kluepfel

17 DOS FEATURE SECTION
A CALL—A.P.P.L.E. TECHNIQUE:
DOS/Pascal Bilingual Disks
Mat Davis

23 A CALL—A.P.P.L.E. REVIEW:
Selection of a Disk System Part 2
Dan Paymar

À LA CARTE

27 Response to Selection of a Disk System Part 2
George K. Peck/Software Engineering Manager
Vista Computer Co., Inc.

29 "Disk Zap": Changing DOS Error Messages
Barton Feroe

37 A CALL—A.P.P.L.E. UTILITY:
In the Dumps
Val J. Golding

46 Passing Array Names
Robert Purves

49 Pager +
Gary Little

55 Print Using Finds a Friend
Craig Peterson

57 IF/THEN/ELSE
Cornelis Bongers/Call —A.P.P.L.E. Staff Writer

63 Find It
Anthony Rose

67 Returning Your Remarks
David Sparks/Call—A.P.P.L.E. Staff Writer

69 Robotic Series Overview and Orientation
Michael Thyng

71 APPLEMASH: Views on Hues
Michael Thyng

82 Global P.L.E. Review
M. Joseph Schaller

HORS d'OEUVRES

5 The Editor Bytes Back
The Editor

7 Bytes From A.P.P.L.E.
Val J. Golding

7 BOOT
Craig MacIntosh

9 So What Did You Expect Dept.?
Frank Heffner

73 WRITE —A.P.P.L.E.
The Readers

77 A.P.P.L.E. Meeting Minutes
Dave Lingwood/Secretary

77 A.P.P.L.E. Source Info

78 Tomorrow's Apples Today
Kevin Donohoe/Editor

87 A.P.P.L.E. Order Form

88 Call—A.P.P.L.E. Unclassifieds

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VISTA V1200

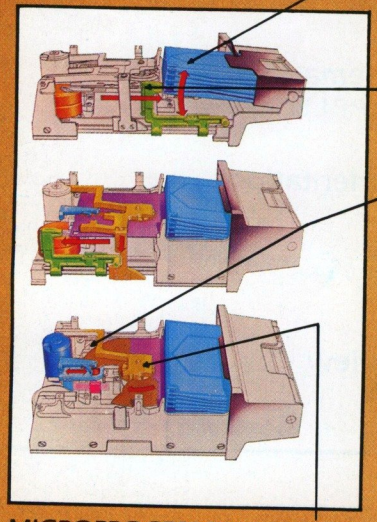
NEW 6MB HARD DISK ALTERNATIVE!

Mass Storage for your Apple II™ has always been a problem. On one hand, there were the exotic, expensive hard disks with no cost efficient means of backup. On the other hand, the Apple floppy drive lacked the speed and storage demanded by today's professionals.

Vista's V1200 offers both at an incredibly attractive price. The removable VistaPak cartridges offer 6 Megabytes of removable storage each and can be backed up like a floppy.

Now hard disk storage and speed can be yours with the added capability of interchangeable media. The V1200 eliminates the worries of head crashes, drive alignments, lost data, or backup with a new application of field-proven floppy technology.

VISTAPAK CARTRIDGE holds five 5¼" diskettes at 1.2 Mega-Bytes each. Selection of the diskette is made by the pak articulator to present the proper diskette to the picker arm.



DISKETTE PICKER grasps the proper diskette and loads it into the drive accurately. The drive senses improper loading, and reclamps the diskette automatically.

MICROSTEP SERVO CONTROL the drive automatically calibrates itself to each diskette individually, assuring interchangeability of media between drives, and making drive alignment a task of the past. Our special servo can move in increments as small as 1/100th of a track, and even track diskettes recorded off-center.

MICROPROCESSOR CONTROLLED SPINDLE speed ensures accurate recording and retrieval of your valuable data.

The Vista V1200 also incorporates features such as; automatic recalibration of the drive if left unused for 2½ minutes, automatic diskette storage should the drive door be opened, and power conservation logic to insure no more than one motor is operating simultaneously to keep temperature down, and reliability high.

The VistaPak cartridges hold 6MB of formatted data each. The removable cartridge allows you to keep duplicates of your valuable data as well as to keep separate paks for your accounting, wordprocessing, spreadsheet and other applications. No other storage device offers more in flexibility and capability.

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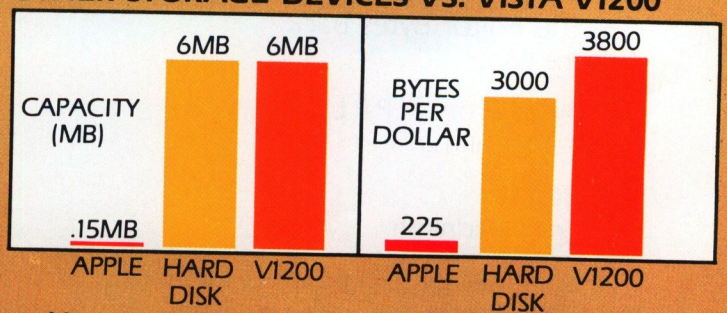

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THE EDITOR BYTES BACK

the editor

THE idea of local variables is one we have thought of from time to time. It is an idea whose time has come in Applesoft and author **Charles Kluepfel** introduces his method on this months cover. This is one of the joys of owning an Apple, along with the vast amount of published information available on it, and the cooperation of the manufacturer in releasing data.

The ampersand command (&) is the most powerful single command in Applesoft, and we must credit Apple's **John Crossley,** who researched and made available to the Apple community (through the pages of **Apple Orchard** and our publication **All About Applesoft),** Applesoft internal entry points and other data.

For example, Crossley's work makes possible the implementation in Applesoft of the **IF/THEN/ELSE** construct as outlined by staff writer **Cornelis Bongers,** whose paper is included in this issue.

Much of the material contributed by **Ralph Swerdlow** in his **A is for Apple** series is based on programs he has developed for his own use, and with his talent for explaining programming concepts to beginners, you should give his cover feature **Envelope Addresser** a try.

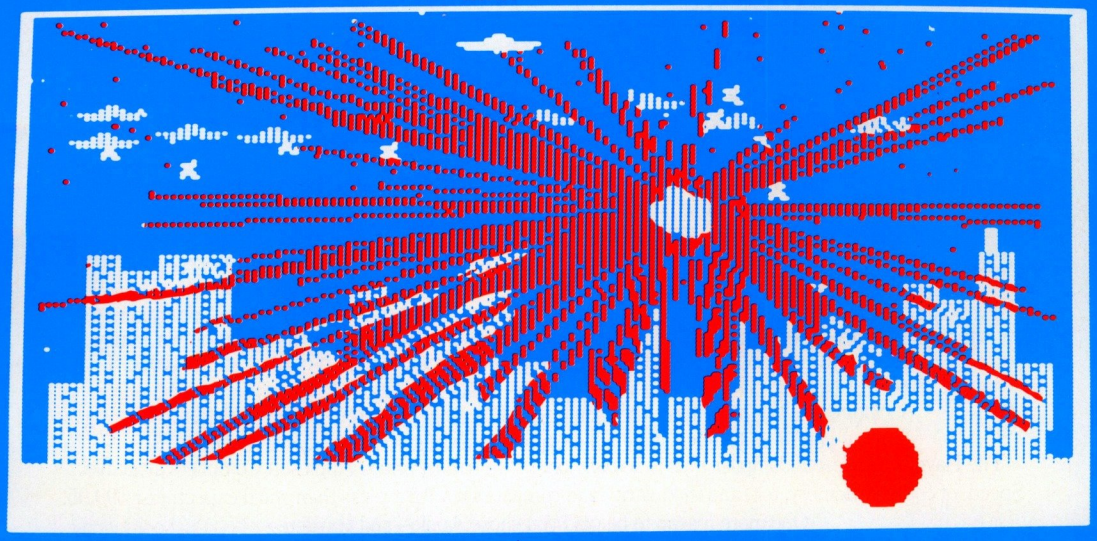
The balance of our cover is taken up with our special **DOS Feature Section. Mat Davis** graces our pages for the first time, and his idea should be of interest to both Pascal and non-Pascal users as he comes up with **Creating Bilingual DOS/Pascal Disks,** a scheme to format a diskette that can be read by either Pascal or DOS 3.3 with neither operating system the wiser.

Dan Paymar returns to conclude his **Selection of a Disk System** with his review of the 8" Qume drive and Vista controller. Dan says this system ended up by meeting most of the criteria he specified in his January story.

We love to write programs, but often must set one aside when we run into a problem that requires more time than we have for resolution. We are lucky that we can call on talented individuals such as **David Sparks** and **Billy Steinberg** to lend us a hand. This dynamic duo made possible the inclusion in this issue of our new **Monitor Dump Utility.** The story of how it was put together **(In the Dumps)** shows how programming can be a cooperative effort. We believe you will find it interesting.

As we write every month, there's still more. **Kevin Donohoe's Tomorrow's Apples Today,** a look at the very latest in unique Apple products, **Write -A.P.P.L.E.,** our popular letters section and the many other features that make **Call -A.P.P.L.E.** the leading Apple computer magazine.

a city dies whenever nightfalls



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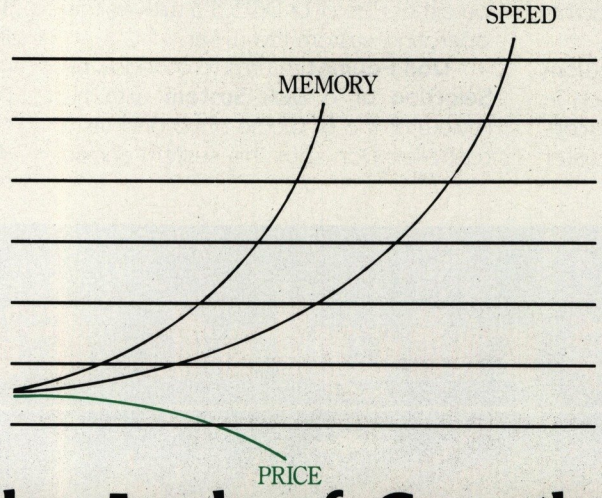

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BYTES FROM A.P.P.L.E.

Val J. Golding

IT'S like a game... Each month we pour through our product catalog to try and figger out how we can save you the member lotsa bucks, while at the same time maintaining some degree of fiscal responsibility on behalf of the club. Be that as it may, we've come up with a couple of doozies for this issue.

Based on the popularity of last year's "Kitchen Sink Special," we threw together a bargain for those readers who have been waiting just for such an opportunity to join. What is one of the major benefits of belonging to A.P.P.L.E.? It's our monthly publication, *Call -A.P.P.L.E.,* with its fine balance of articles and programs for beginners and advanced programmers, and what we've done is to put together a cumulative add-on package that can save you up to 38% overall. Here's how it works:

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Note: Foreign and overseas memberships and orders require additional postage.

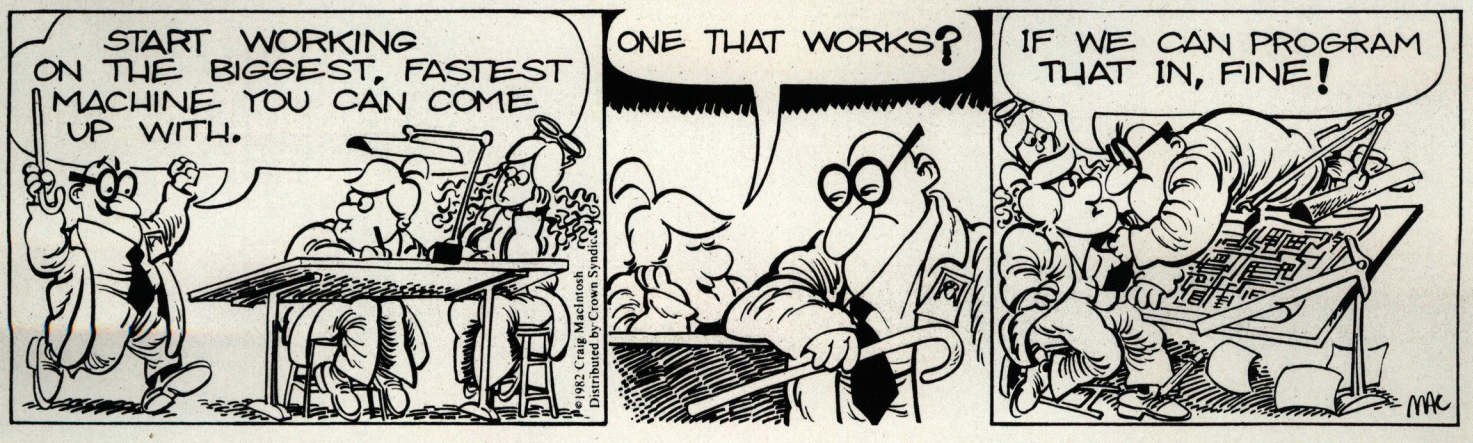
This offer expires *Nov. 30, 1982* and may not be combined with any other membership special. You can also use your Visa or Mastercard and order by phone at (206) 271-4514. The anthology disks contain programs published in *Call -A.P.P.L.E.* for the same period as the accompanying bound volumes.

If the preceding savings weren't enough to convince you, look at this kicker: for just $22.50 (you have to see it to believe it) we are introducing **THE Spreadsheet,** a highly sophisticated worksheet/forecasting model the equal of programs selling in the hundreds of dollars, written by three of the Apple community's best known names, **Randy Wigginton, Guil Banks** and **Steve Wozniak.** The $22.50 price includes an 80 page reference and tutorial manual and two diskettes. We will be shipping in November. You may now order this fine A.P.P.L.E. product but all Spreadsheet orders must be a single order (in a separate envelope) and not combined with any other order. Please mark "Spreadsheet order" on outside of envelope.

Scheduled for October shipping is the 192 page Volume 2 of **Call -A.P.P.L.E. in Depth: All About Pascal.** This work will be to Pascal what *All About Applesoft* was to BASIC. Members low price is just $11.

BOOT

Craig MacIntosh



Crown Syndicate, Inc., Five Crown Road, Weatherford, Texas 76086. Telephone (817) 594-5125.

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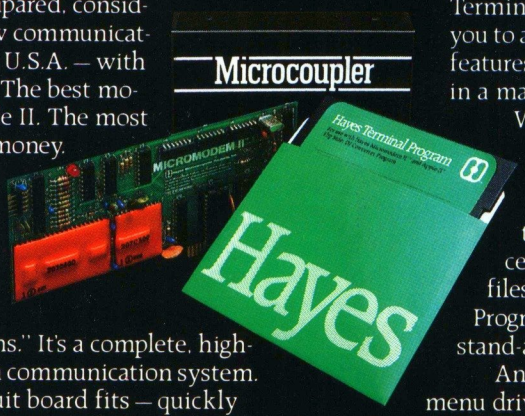

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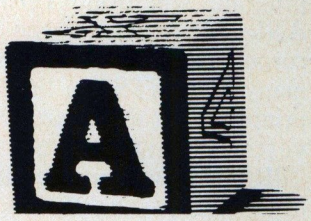
A IS FOR APPLE:

Envelope Addresser

Ralph H. Swerdlow, M.D./Call —A.P.P.L.E. Staff Writer



IF you have an impact type of printer, either a dot matrix or daisy wheel, you can address your envelopes using this program. It will first ask you for the name of the party you are sending your letter to, then the address, city, state, and finally the zipcode. After all the information is typed in, the program will print the data and ask if you have any corrections or if all is correct. It is easy to correct any part of the address data if you made a mistake in entering the data.

If all is correct, the program then asks if you want to have your return address typed in the upper left corner of the envelope and for the size of the envelope that you are using. Some of my envelopes have been printed professionally (by a printer) and have my return address already embossed; others are blank, and this option enables me to print or not to print a return address depending on which envelope I intend to use. A small envelope is about six and one half inches across, and a large one is nine and one-half inches. After the choice is made, the program will print to properly place the name and address of the addressee on the envelope.

The program next instructs you to insert an envelope; do so, press "RETURN," and the data entered will be nicely printed and formatted on your envelope.

Lets look at the program:

```
10 REM SO WHAT DID YOU
   EXPECT?
FRANK HEFFNER : CALL
 -A.P.P.L.E.
100 PRINT IBM IS A NICE
    COMPUTER
110 PRINT NOTHING IS NICER
    THAN APPLE
```

```
0   REM ******************
1   REM ENVELOPE
        ADDRESSER
4   REM BY
5   REM RALPH H.
        SWERDLOW,M.D.
6   REM CALL-APPLE
7   REM SEPT. 1982
8   REM ******************
10  HOME
20  INPUT "NAME :";N$
30  INPUT "ADDRESS :";A$
40  INPUT "CITY :";C$
50  INPUT "STATE :";S$
60  INPUT "ZIP :";Z$
70  PRINT : PRINT
80  HOME
90  PRINT N$
100 PRINT A$
110 PRINT C$ + ", ";S$
120 PRINT Z$
130 PRINT
```

These lines first clear the screen, and ask the user to type in the data when asked. In Integer, use CALL -936 instead of "HOME." Line 80 then clears the screen again, and lines 90 to 110 print out the information that was earlier entered. The name and address are each printed on single lines. Line 110 first prints out the city, then concatenates a comma, and then prints out the state, all on one line. Note the use of the "+" to do this and note the space after the comma, which separates the state from the previous character, making the format more attractive. Line 120 prints the zipcode, and line 130 prints a blank line on the screen. This gives the user an opportunity to review what was entered and later to be typed on the envelope.

```
140 PRINT : PRINT "ALL
    CORRECT....Y/N?":
    GET Q$
150 IF Q$ = "N" THEN GOTO
    360
155 IF Q$<>"Y" AND Q$<>"N"
    THEN GOTO 140
160 PRINT : PRINT "RETURN
    ADDRESS ALSO...Y/N?":
    GET RA$
```

Line 140 asks if the data you entered is correct. If so the program continues by asking the user if a return address should also by typed on the envelope. If the data entered requires correction, line 150 directs the program to line 360, where this will be done. Line 155 directs the program back to line 140 if the answer given is neither "Y" nor "N." Line 160 prints a blank line and asks if a return address should also be typed.

```
170 PRINT : PRINT "  L
    FOR LARGE,  S  FOR
    SMALL ENVELOPE"
180 GET W$
190 IF W$ = "L" THEN P =
    40
200 IF W$ = "S" THEN P =
    30
210 PRINT:PRINT "INSERT
    ENVELOPE AND HIT ANY
    KEY": GET K$
220 IF RA$ = "N" THEN
    GOTO 240
230 IF RA$ = "Y" THEN
    GOTO 780
235 IF RA$ < > "Y" AND RA$
    < > "N" THEN PRINT
    CHR$ (7): GOTO 160
240 PRINT
250 PRINT
260 PRINT CHR$ (4);"PR#1"
270 PRINT : PRINT CHR$
    (9);"80N"
300 PRINT : PRINT : PRINT :
    PRINT : PRINT : PRINT :
    PRINT : PRINT : PRINT
310 POKE 36,P: PRINT N$
320 POKE 36,P: PRINT A$
330 POKE 36,P: PRINT C$ +
    "," + S$
340 POKE 36,P: PRINT Z$
350 PRINT CHR$ (4);"PR#0":
    PRINT "DONE": END
```

These lines ask for the size of the envelopes, and then sets "P" accordingly, so the address will be placed in the proper area of the envelope. This is done by POKEing 36 with "P." This is identical to using

—●→

ENVELOPE ADDRESSER

"TAB(P)," but will work beyond column 40. If "RA$"= "Y" the program will print YOUR NAME AND ADDRESS at the upper left corner by going to line 780. Why so many "PRINTS" in line 300? Most printers print six horizontal lines per vertical inch. Thus, these 9 "PRINTS" will position the top line of the address slightly more than one and a half inches below the top of the envelope. You can add or subtract "PRINT" commands to suit your own taste and printer output. Experiment and find how many "PRINTS" work best for you. Lines 310 to 350 then print out the envelope, returns control of the computer, and prints "DONE." If your printer is not in slot #1, then change line 260 to what ever is required. I have left blank lines here so that you can add any special characters your printer may need to function!

```
360     PRINT : PRINT
370     PRINT : PRINT : PRINT
        "CORRECT WHICH?"
380     PRINT "  1   NAME"
390     PRINT "  2   ADDRESS"
400     PRINT "  3   CITY"
410     PRINT "  4   STATE"
420     PRINT "  5   ZIPCODE"
430     GET R$
435     R=VAL(R$)
```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Lines 360 to 430 are used to enable you to correct any errors that might have been made in the entry of the data. They ask the user which information should be changed by a small menu presentation. Line 430 gets "R$" which is the response. Since there are bugs in the Applesoft GET routine, line 435 converts R$ to R with the VAL function. GET should be used only with string variables.

```
440  IF R = 1 GOTO 500
450  IF R = 2 THEN GOTO 560
460  IF R = 3 THEN GOTO 610
470  IF R = 4 GOTO 670
480  IF R = 5 THEN GOTO 730
490  IF R < > 1 AND R < > 2
     AND R < > 3 AND R < > 4
     AND R < > 5 THEN PRINT
     CHR$ (7): HOME : GOTO 370
```

These lines direct the Apple to the sections of the program where the corrections are to be made. Note the use of an arithmetic value in the choice, "R," and how the program is diverted to special locations depending on the value of "R." Line 490 is used to insure that "R" takes on the value of 1 to 5, will sound the bell if it is not, and then will direct the program back to line 370 once again.

```
500  HOME
510  PRINT "OLD NAME :";N$
520  INPUT "ENTER CORRECT
     NAME :";NC$
530  N$ = NC$
540  HOME
550  GOTO 80
```

Lines 500 to 550 are typical of the correcting portion of the program. The screen is first cleared, the "OLD NAME" is printed and an "INPUT" requests the corrected name (NC$). Line 530 changes NC$ into N$ and the program goes back to line 80, where the "CORRECTED NAME" is now presented. The remainder of this section follows the same format. Can you see a way to combine all the correcting lines into one sub-routine? I leave this as a problem to solve, but it is not difficult to do. I have not used a subroutine here for ease of understanding. Hint:substitute a "dummy" string for whatever needs to be changed, do the correction, and convert the "dummy" string back to the proper one.....

```
560  HOME : PRINT "OLD
     ADDRESS :";A$
570  INPUT "ENTER CORRECT
     ADDRESS :";CA$
580  A$ = CA$
590  HOME
600  GOTO 80
610  HOME
620  PRINT "OLD CITY :";C$
630  INPUT "CORRECT CITY
     :";CC$
640  C$ = CC$
650  HOME
660  GOTO 80
670  HOME
680  PRINT "OLD STATE :";S$
690  INPUT "CORRECT STATE
     :";CS$
700  S$ = CS$
710  HOME
720  GOTO 80
730  HOME
740  PRINT "OLD ZIPCODE :";Z$
750  INPUT "ENTER CORRECT
     ZIPCODE :";CZ$
760  Z$ = CZ$
770  HOME : GOTO 80
780  PRINT : PRINT CHR$
     (4);"PR#1"
790  PRINT CHR$ (9);"80N"
800  PRINT
810  PRINT "MY NAME"
820  PRINT "MY ADDRESS"
830  PRINT "MY CITY";",";
     "MY STATE"
840  PRINT "MY ZIPCODE"
850  PRINT : PRINT : PRINT
860  PRINT : PRINT : PRINT :
     PRINT : GOTO 310: END
```

Lines 780–860 set your printer, and then print your name and address as the return on the envelope. Again note that if your printer is in a slot other that #1, line 780 must be changed to reflect this.

In lines 810–840, add YOUR NAME, ADDRESS, CITY, STATE AND ZIPCODE, and these will be printed as you typed them. They become a permanent part of the program, but can be changed at will if there is a need to do so.

All of the "PRINTS" in lines 850 and 860 add blank lines to the envelope, and you will need to add or subtract to best print the envelope. You may alter the value of "P" in lines 190 and 200 to best suit your printer output.

Save this program to a disk using the name "ADDRESSER," and whenever you need to address envelopes, run the program. The postman will thank you, for he will be able to read your addresses very easily.

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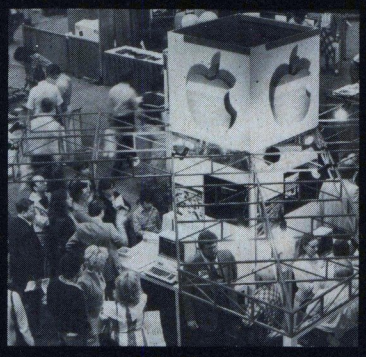

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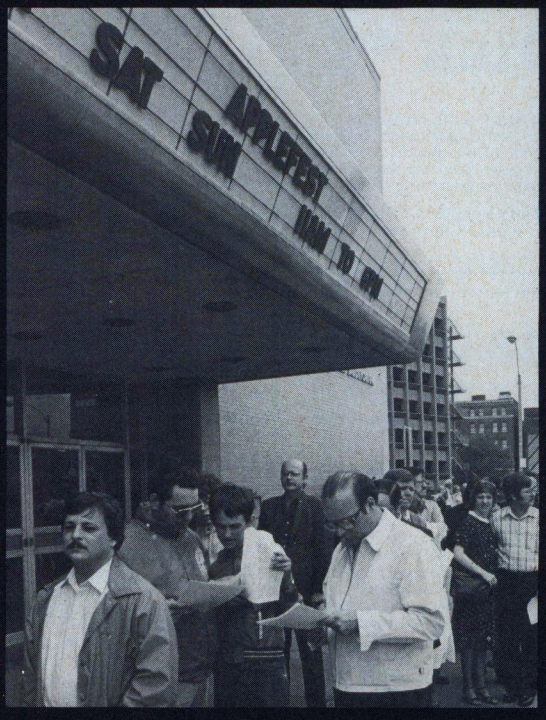

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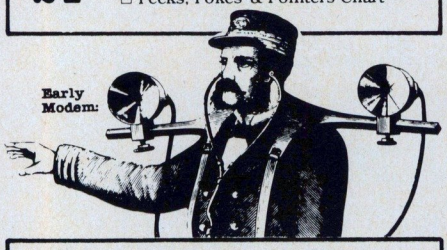

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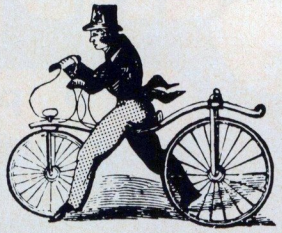

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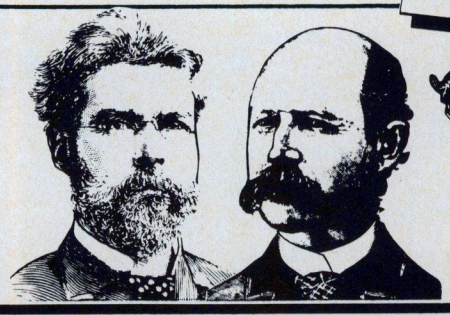

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A **Call —A.P.P.L.E.** TECHNIQUE:

Local Variables for Applesoft

Charles Kluepfel

ONE of the capabilities that allows a language such as Pascal to be called "structured" is that of local variables. This facility is the ability for internal subroutines or procedures to reference variables with the same names as variables in the main stream of the program, but that are actually different variables, ... local variables, defined locally in the subroutine.

...local variables are defined within the subroutines.

The BASIC language does not support local variables, thus all variables are what is known as global; any reference to variable AB in a subroutine is a reference to any variable of the same name anywhere else in the program. The disadvantage of this is that subroutines EXECed into a program from a set of standard subroutines must not use any variables used in the main body of the including program; that is, the calling program must be written to avoid using those variables used in the subroutines it includes. Local variables in the subroutines would not conflict with variables of the same name elsewhere in the program.

The assembly language program in listing 1 allows an Applesoft programmer to use local variables within his/her BASIC program. Listing 2 is an example of the use of local variables through this method. We shall describe this use first.

After line 15 of the BASIC program BLOADs the machine language, line 20 sets up variables LV% and LR% to point to the addresses of the entry point for going to a local set of variables and restoring the main body variable set, respectively.

As communication needs to take place between the main program and the subroutine that uses local variables, and since there is no passing of parameters to a subroutine, some

...global variables must remain accessible...

global variables must remain accessible to both the main program and the subroutine. This is accomplished by specifying that the first so many (here represented by N) variables used in the main program are to be known globally, even in the subroutine. Line 25 sets up the order of variables to be used. Note that LV% and LR% here are the first two variables. Note also that arrays are *not* included among the global variables and are not counted in the variable count. Up to 18 variables can be made global. Another limitation is that there can be no nesting of subroutines with separate local variable sets, as only one local set can be in effect at any one time. Separate subroutines can independently use local variables, so long as neither calls the other.

Separate subroutines can independently use local variables...

Line 30 of the Applesoft program initializes the variables to some values, to see how they are affected by the subroutine when made global. Line 35, with line 65, verifies that an array comes through unscathed.

Lines 40 - 60 call an internal subroutine, telling it how many of the main program's variables are to be known within the subroutine. They then report the contents of variables after the GOSUB has been completed. That subroutine, beginning at line 1000 CALLs the LOCALVARS program specifying N global variables. Line 1010 shows what it has as

Listing 2

```
]LIST

10  REM

LOCAL VARIABLES : CHAS KLUEPFEL

 CALL -A.P.P.L.E. :  OCT. 1982

15  PRINT  CHR$ (4)"BLOAD LOCALVA
    RS"
20 LV% = 768:LR% = 771
25 A = 0:B = 0:C = 0:A$ = "":B$ =
    "":C$ = ""
30 C = 3:B = 2:A = 1:C$ = "SEE":B
    $ = "BEE":A$ = "AY"
35  FOR I = 1 TO 10:A(I) = 2 * I:
     NEXT
40 N = 3: GOSUB 1000: PRINT "AFTE
    R SBR:",N,A,B,C,A$,B$,C$
50 N = 4: GOSUB 1000: PRINT "AFTE
    R SBR:",N,A,B,C,A$,B$,C$
60 N = 7: GOSUB 1000: PRINT "AFTE
    R SBR:",N,A,B,C,A$,B$,C$
65  FOR I = 1 TO 10: PRINT A(I): NEXT

70  END : REM

1000  CALL LV%N
1010  PRINT "IN SBR:",A,B,C,A$,B$
    ,C$
1020 A = 77:B = 88:C = 99:A$ = "X
    X":B$ = "YY":C$ = "ZZ"
1025  CALL LR%
1030  RETURN
```

LOCAL VARIABLES

the contents of some variables under consideration; line 1020 modifies them; line 1025 returns to the main program's full set of variables; then line 1030 RETURNs from the subroutine.

The first eight variables, and their initial values, in this program, are LV% = 768, LR% = 771, A = 1, B = 2, C = 3, A$ = "AY," B$ = "BEE," C$ = "SEE." The subroutine is invoked successively with 3, 4, and 7 global variables. Thus the first time through, only LV%, LR%, and A are global, and the first printout IN SBR: shows only A has its value, 1, while B, C have fresh 0 values, and the strings have their fresh null values. After the first return, then, for N = 3, only the variable A is reported as having been changed by the subroutine, to 77.

The second time through the subroutine, with four global variables, A has its new global value, 77, B has its original outside value, 2, and the others being local are uninitialized again, C being zero, and the strings null. After returning to the main program, A and B have the values assigned within the subroutine, 77 and 88, respectively.

The third time through, there are seven global variables, including A, B, C, A$, and B$, and indeed IN SBR: reports the global values 77 and 88, assigned previously as global within the subroutine, 3, "AY," and "BEE," the initial values of the main routine's C, A$, and B$; but being non-global, C$ is again initialized to null. Upon return, the variables that were global within the subroutine have been changed to new values, 77, 88, 99, "XX," and "YY." Main routine variable C$, never having been involved with the subroutine, retains its initial value, "SEE".

The remainder of the output is just the verification that the array came through OK.

The assembly program has two entry points...

The assembly language program that is CALLed (listing 1) has two entry points, one of which sets up local vs. global variables, and the other restores the full set of main routine variables. The code is not relocatable, so it needs to be reassembled if you do not want to use page 3. To ease remembering the starting locations of the two entry points, JMP instructions are provided at the beginning, the first at decimal 768 (a usual starting point), and the other immediately following (771, as a JMP instruction takes 3 bytes).

The setup of local vs. global variables begins at LOCAL where the JSR FRMNUM seeks the parameter following the CALL, putting the value into the FAC (floating accumulator), which CONINT converts to an

Listing 2 continued

```
]
]RUN
IN SBR:        1        0
0

AFTER SBR:     3        77
2              3        AY
BEE            SEE
IN SBR:        77       2
0

AFTER SBR:     4        77
88             3        AY
BEE            SEE
IN SBR:        77       88
3              AY       BEE

AFTER SBR:     7        77
88             99       XX
YY             SEE
2
4
6
8
10
12
14
16
18
20
```

Listing 1

```
:ASM
                    ********************************
                    *                              *
                    * Local Variables in Applesoft *
                    *      by  Charles Kluepfel    *
                    *                              *
                    * Call -A.P.P.L.E. : Oct. 1982 *
                    *                              *
                    ********************************

                    TXTTAB   EQU  $67
                    VARTAB   EQU  $69
                    ARYTAB   EQU  $6B
                    STREND   EQU  $6D
                    FRETOP   EQU  $6F
                    MEMSIZ   EQU  $73
                    SENDVAR  EQU  $CE
                    REASON   EQU  $D3E3
                    FRMNUM   EQU  $DD67
                    QTYERR   EQU  $E199
                    GARBAG   EQU  $E484
                    CONINT   EQU  $E6FB

                    *
                             ORG  $300
                    *

0300: 4C 13 03               JMP  LOCAL
0303: 4C 95 03               JMP  RESTORE

                    VARNUM   DS   1
                    VTHOLD   DS   2
                    ATHOLD   DS   2
                    STRHOLD  DS   2
                    FTHOLD   DS   2
                    FSHOLD   DS   2
                    MSHOLD   DS   2

0313: 20 67 DD      LOCAL    JSR  FRMNUM
0316: 20 FB E6               JSR  CONINT
0319: 8E 06 03               STX  VARNUM
031C: 8A                     TXA
031D: 18                     CLC
031E: 6D 06 03               ADC  VARNUM
0321: B0 6F                  BCS  ERR
0323: 8D 07 03               STA  VTHOLD
0326: 6D 07 03               ADC  VTHOLD
```

```
0329: B0 67      48              BCS   ERR
032B: 6D 07 03   49              ADC   VTHOLD
032E: B0 62      50              BCS   ERR
0330: 6D 06 03   51              ADC   VARNUM
0333: B0 5D      52              BCS   ERR
0335: 30 5B      53              BMI   ERR
0337: 8D 06 03   54              STA   VARNUM
033A: 20 84 E4   55              JSR   GARBAG
033D: A5 6D      56              LDA   STREND
033F: 18         57              CLC
0340: 6D 06 03   58              ADC   VARNUM
0343: AA         59              TAX
0344: A5 6E      60              LDA   STREND+1
0346: 69 00      61              ADC   #0
0348: A8         62              TAY
0349: 8A         63              TXA
034A: 20 E3 D3   64              JSR   REASON
034D: A0 0C      65              LDY   #12          ;Decimal
034F: B9 68 00   66   PTRLOOP    LDA   VARTAB-1,Y
0352: 99 06 03   67              STA   VTHOLD-1,Y
0355: 88         68              DEY
0356: D0 F7      69              BNE   PTRLOOP
0358: A5 6D      70              LDA   STREND
035A: 18         71              CLC
035B: 6D 06 03   72              ADC   VARNUM
035E: 85 6B      73              STA   ARYTAB
0360: 85 6D      74              STA   STREND
0362: A5 6E      75              LDA   STREND+1
0364: 69 00      76              ADC   #0
0366: 85 6C      77              STA   ARYTAB+1
0368: 85 6E      78              STA   STREND+1
036A: AD 0B 03   79              LDA   STRHOLD
036D: 85 69      80              STA   VARTAB
036F: AD 0C 03   81              LDA   STRHOLD+1
0372: 85 6A      82              STA   VARTAB+1
0374: AD 07 03   83              LDA   VTHOLD
0377: 85 CE      84              STA   SENDVAR
0379: AD 08 03   85              LDA   VTHOLD+1
037C: 85 CF      86              STA   SENDVAR+1
037E: AC 06 03   87              LDY   VARNUM
0381: 88         88              DEY
0382: B1 CE      89   DATALOOP   LDA   (SENDVAR),Y
0384: 91 69      90              STA   (VARTAB),Y
0386: 88         91              DEY
0387: 10 F9      92              BPL   DATALOOP
0389: A5 6F      93              LDA   FRETOP
038B: 85 73      94              STA   MEMSIZ
038D: A5 70      95              LDA   FRETOP+1
038F: 85 74      96              STA   MEMSIZ+1
0391: 60         97              RTS
                 98
0392: 4C 99 E1   99   ERR        JMP   QTYERR
                 100
0395: A5 69      101  RESTORE    LDA   VARTAB
0397: 85 CE      102             STA   SENDVAR
0399: A5 6A      103             LDA   VARTAB+1
039B: 85 CF      104             STA   SENDVAR+1
039D: A0 06      105             LDY   #6
039F: B9 06 03   106  RSTRLOOP   LDA   VTHOLD-1,Y
03A2: 99 68 00   107             STA   VARTAB-1,Y
03A5: 88         108             DEY
03A6: D0 F7      109             BNE   RSTRLOOP
03A8: AC 06 03   110             LDY   VARNUM
03AB: 88         111             DEY
03AC: B1 CE      112  DL2        LDA   (SENDVAR),Y
03AE: 91 69      113             STA   (VARTAB),Y
03B0: 88         114             DEY
03B1: 10 F9      115             BPL   DL2
03B3: AD 11 03   116             LDA   MSHOLD
03B6: 85 73      117             STA   MEMSIZ
03B8: AD 12 03   118             LDA   MSHOLD+1
03BB: 85 74      119             STA   MEMSIZ+1
03BD: 60         120             RTS

--End assembly--

190 bytes

Errors: 0
```

integer in the X register, which is then stored in VARNUM, within this program. The following few instructions in effect multiply the value by 7, as there are 7 bytes per simple variable in the variable table, and we wish to index through the variables to set up a new variable table with only the global variables copied over.

...a new data storage area is set up above the old area...

As we are going to set up a new data storage area above the end of the old variable area, and below where the string storage is located, and we want as much space as possible in which to work, we CALL GARBAG to clean up the storage space. To be sure we have enough room for the new variable table, lines 56 – 64 set up the proposed ending address in the Y and A registers, so REASON can evaluate if it runs into the strings. REASON can cause a garbage collection but we put the preceding call to GARBAG to get as much room as possible even if collection is not needed at the moment.

The pointers that define the data storage areas are VARTAB, pointing to the first byte of simple variable storage; ARYTAB, pointing to the first byte of array storage; STREND, pointing to the byte after the last used as part of the array table, thus the first available ordinarily for the storage of string values; FRETOP, the first byte actually occupied by string storage; and MEMSIZE, otherwise known as HIMEM, the first byte not used by variables or anything in the Applesoft program. Lines 65 – 69 save these pointers for later restoration, and for use in setting up the modified pointers to begin with. Lines 70 – 78 add the number of bytes in the new variable table (simple variables only, no arrays) to the value in STREND, storing the total in ARYTAB and STREND so they will point to the first byte after the new simple variable table, as that begins at the old STREND. Lines 79 – 82 set up that beginning by moving the saved STREND to VARTAB. Lines 83 – 86 prepare for a moving of the data in the variable table by setting up the saved VARTAB to a page zero

—◉→

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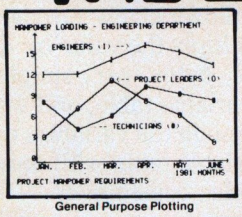

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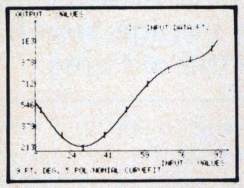

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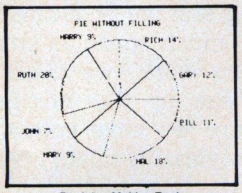

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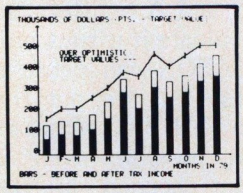

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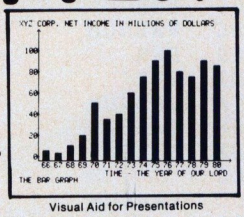

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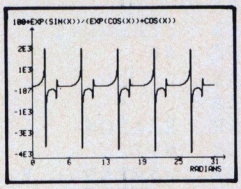

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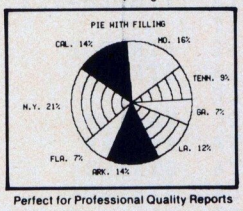

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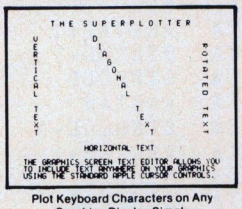

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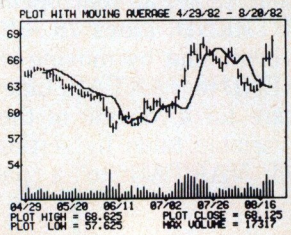

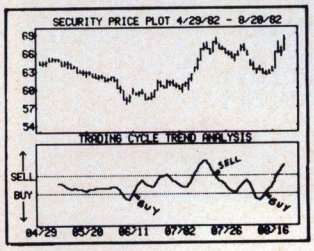

LOCAL

pointer, SENDVAR, and lines 87 - 92 do the move, using VARNUM as the number of bytes to be moved. String values set up by the main program are protected by setting MEMSIZ (HIMEM) to the old value of FRETOP (lines 93 - 97); the protection is from garbage collections that might take place during the subroutine, as strings known only to the outer program would not be seen since the new active variable table does not point to them. Any string values pointed to be global variables are still available even though now above HIMEM.

RESTORE undoes the new variable table, but first the values in that new table have to be transferred back to the main routine's variable table area. Actually only the global variables of the new variable table are to be sent, as local variables may have made the table bigger than when we first set it up. Lines 101 - 104 set up the address of the sending area while it is still available in VARTAB, and lines 110 - 115 do the actual transfer, again using the length originally moved, VARNUM. Lines 105 - 109 restore VARTAB, ARYTAB, and STREND to their original locations. Lines 116 - 120 restore MEMSIZ (HIMEM) to its original value. FRETOP must stay at the value left by the subroutine as new values of global string variables may be found there and above. Future garbage collections will get rid of any not really needed.

Note that locations $CE and $CF are used by this program. If this causes any conflict, change SENDVAR and SENDVARP to some other pair of consecutive unused locations in page zero (see pp.74–75 of the Apple][Reference Manual for unused locations).

A **Call —A.P.P.L.E.** TECHNIQUE:

DOS/Pascal Bilingual Disks

Mat Davis

ONE of the Apple's strongest points is its ability to use multiple operating systems such as DOS 3.3 and Pascal. For someone who uses both of these operating systems, there are times when it would be convenient to have disks that both Pascal and DOS could use. Such a disk would be useful for individual users who are trading programs or for user groups who want to have some Pascal programs in their library without using an entire disk for only 80 blocks of programs.

The Pascal program BILINGUAL will create a disk that may be used by both Pascal and DOS and make sure that neither operating system will overwrite the other's files. Since the two systems handle files and free space in different ways, two methods are used to prevent conflicts.

Pascal allocates all files in contiguous blocks...

Pascal allocates all files in contiguous blocks on the disk and considers anything that is not in a file to be free space. Therefore, to keep the Pascal system from using a particular area of the disk, a file must be created in that area. Also, the file type should be set to BAD to prevent the Filer's Krunch command from moving the file. For information on the Pascal directory format, the May '81 issue of *Byte* contains an article entitled "A File Catalog System for UCSD Pascal" by Edward Heyman which has a program containing all of the declarations and code necessary to manipulate the directory. Another approach may be found in the article "In the Depths of the Pascal Directory" by Harvey Greenberg in the May '81 issue of *Call -A.P.P.L.E.;* the article "Pascal Disk Directory Structure" by Allen W. Todd in *Call -A.P.P.L.E. in Depth No. 2: All About Pascal* may also be of interest.

Modifying the directory is accomplished by using the Pascal intrinsic procedures UNITREAD and UNITWRITE. These are among the most powerful (and most dangerous) features of Apple Pascal. They allow the programmer to read from and write to any block on a disk, including the directory and system areas. With such procedures, it is possible to write programs entirely in Pascal that otherwise would be impossible to write without using assembly language. Care must be used with these procedures, however, to avoid destroying a disk inadvertently. It is best to always test programs using UNITREAD and UNITWRITE on a scratch disk first to make sure they perform as expected. Detailed information on these procedures can be found on page 41 of the Apple Pascal 1.1 Language Reference Manual.

To change the type of a file to BAD, the directory must be read from the second block of the disk, the file type changed, and the directory written back to the disk. To shorten this program, the directory is read into an array and the proper location changed without using the declarations from the Byte article, since very little manipulation of the directory is needed.

Unlike Pascal, DOS spreads files wherever there is space.

Unlike Pascal, DOS spreads files across the disk wherever there is space. Since the free areas of the disk are randomly distributed, DOS keeps a free space map in its Volume Table of Contents, or VTOC, which is stored in sector 0 of track 17 (decimal) on every DOS diskette. Therefore, to keep DOS from using a particular area of the disk, it is necessary to mark those areas as used in the free space map. An excellent book covering the disk format is *"Beneath Apple DOS,"* by Don Worth and Pieter Lecher, available from A.P.P.L.E. (for members only) or from Quality Software. The same information with considerably less explanation can be found in "Format of Disk Information" in Appendix C of the DOS manual.

To set up the DOS area of the disk, a single array is used in which the VTOC and directory are created. To create them, the procedure CREATEDOSDIR zeros out the array, sets up the VTOC, and links the directory sectors together. After it is created, the directory is written to track 17 of the disk using UNITWRITE. Since there are eight Pascal blocks per track, the block number for the beginning of track 17 is 8 * 17, or 136. Also, there are 256 bytes/sector * 16 sectors/track, so 16384 bytes must be written.

The conversion must be started with a Pascal disk...

The conversion must be started with a Pascal disk if the disk is to be bootable after conversion, since the Pascal directory occupies the same locations as the DOS boot tracks. To make the disk fully bootable, the files SYSTEM.APPLE and SYSTEM.PASCAL should be placed on the Pascal portion of the disk. Since only a Pascal disk will boot properly after the conversion, the program assumes that the disk to be converted is a properly formatted Pascal disk.

—(2)→

DOS/PASCAL BILINGUAL DISKS

The main program does nothing more than provide a means for more than one disk to be converted without having to re-execute the program for each disk. It calls the CREATE procedure to create the disks.

The CREATE procedure makes sure that a disk is to be created. The only answer that will continue the process is "Yes." Any other variation such as "Y" will not be accepted, to insure that a disk is not accidentally converted. After verifying that a disk is to be created, CREATE calls three procedures to do the work.

ZEROPASCALDIR zeros out the Pascal directory, erasing all files that were originally on the disk. It would be possible to write the program so that existing files are not lost, but the effort involved would probably not be worth it, since the disk to be converted will most likely be freshly formatted. In zeroing out the directory, the first 26 bytes are left undisturbed to preserve the volume name.

CREATEDOSFILE creates the DOS VTOC and directory. Creating the VTOC consists of setting various bytes to constant values and creating the free space map so that DOS will not use the Pascal area of the disk.

Creating the DOS directory is simple...

Creating the directory is relatively simple; it involves simply setting sectors 1 through 15 to zero and then linking them together. When the track is ready to be written, the program uses UNITWRITE for simplicity, instead of opening DOS-3.3-FILES, writing to the file with BLOCKWRITE, and closing the file.

The program hopefully has all of the comments necessary so that its basic operation can be understood. The comments may be omitted to make the program easier to enter, but if the program is to be modified, the extra typing effort could be worthwhile. If you do not have any way to type the braces or underline character, the left and right braces can be replaced with "(*" and "*)" respectively, and the underline may be omitted since the compiler ignores them.

Using a technique similar to this, it should be possible to create a file that both Pascal and DOS can read without running a special conversion program first. Such a file could be combined with a "bilingual" disk to create systems consisting of both Pascal and BASIC programs sharing

...two-way files are the next logical step...

the same datafiles. Such two-way files are the next logical step in this project, although creating them would not be as simple as creating two-way disks. Another extension would be to create disks for use between CP/M and either Pascal or DOS, but at the present time there is not enough information on the CP/M disk format avaliable.

This program was written as a part of a project directed by Dr. Donald Crouch as a part of the Computer Based Honors Program at the University of Alabama. The CBH program involves one year of accelerated programming classes followed by three years of projects assisting members of the faculty in applying the computer to research projects in many fields. Anyone interested in this program should contact Director, Computer Based Honors Program, P.O. Box 803, University, AL, 35486, or phone (205) 348-5029.

```
program bilingual;

{*************************************************************************}
{                                                                         }
{ BILINGUAL by Mat Davis, 17-Jan-82                                       }
{                                                                         }
{ This program will create a bilingual disk that can be used by both      }
{ Pascal and DOS 3.3 without conflict. Must be used only on Pascal        }
{ formatted disks, since the Pascal directory would overwrite the DOS     }
{ system tracks on a DOS-formatted disk.                                  }
{                                                                         }
{*************************************************************************}

const
  eraseol=29; { Ctrl-] }
  eraseos=11; { Ctrl-K }

type
  byte=0..255;
  set_of_char=set of char;

var
  cmd: char;
```

```
{*************************************************************************}
{                                                                         }
{ GETCMD                                                                  }
{                                                                         }
{ Get a character in OK into CMD                                          }
{                                                                         }
{*************************************************************************}

procedure getcmd(ok: set_of_char);

  begin { getcmd }
    repeat
      read(keyboard,cmd);
      if cmd in ['a'..'z'] then cmd:=chr(ord(cmd)-32);
    until cmd in ok;
  end;  { getcmd }

{*************************************************************************}
{                                                                         }
{ WRITE_DOS_DIR                                                           }
{                                                                         }
{ Create a DOS directory and put it on the disk                           }
{                                                                         }
{*************************************************************************}

procedure write_dos_dir;

  var
    dos_dir: array [0..15] of packed array [0..255] of byte;
    trans: array [0..15] of integer;
    i: integer;

  begin { write_dos_dir }
    gotoxy(8,0);
    write(chr(eraseos),'Writing DOS directory...');
    { Set up sector translation table }
    trans[0]:=0;
    for i:=1 to 14 do
      trans[i]:=15-i;
    trans[15]:=15;
    { Zero the dir }
    fillchar(dos_dir,sizeof(dos_dir),chr(0));
    { Set up VTOC }
    dos_dir[0][  1]:= 17; { Directory track              }
    dos_dir[0][  2]:= 15; { Directory sector             }
    dos_dir[0][  3]:=  3; { DOS version number           }
    dos_dir[0][  6]:=  1; { Disk volume number           }
    dos_dir[0][ 39]:=122; { Track/Sector pairs           }
    dos_dir[0][ 48]:= 17; { Last allocation              }
    dos_dir[0][ 49]:=255; { Allocation direction         }
    dos_dir[0][ 52]:= 35; { Tracks/Disk                  }
    dos_dir[0][ 53]:= 16; { Sectors/Track                }
    dos_dir[0][ 55]:=  1; { Bytes/Sector (High byte)     }
    { Make free space map }
    dos_dir[0][ 56]:=128; { Track 0, Sector 15           }
    dos_dir[0][ 57]:= 14; { Track 0, Sectors 1..3        }
    for i:=60 to 123 do
      dos_dir[0][i]:=255;
    { Link directory sectors }
    for i:=15 downto 2 do begin
      dos_dir[trans[i]][1]:=17;
      dos_dir[trans[i]][2]:=i-1;
    end; { for }
    { Write it to disk }
    unitwrite(5,dos_dir,4096,136);
  end;  { write_dos_dir }

{*************************************************************************}
{                                                                         }
{ CREATE_DOS_FILE                                                         }
{                                                                         }
{ Create the "bad" file for the DOS VTOC, directory, and files            }
{                                                                         }
{*************************************************************************}
```

```
procedure create_dos_file;

  var
    dir_buffer: packed array [0..511] of byte;
    f: file;
    junk: integer;

  begin { create_dos_file }
    gotoxy(8,0);
    write(chr(eraseos),'Creating DOS file...');

    { Create DOS_3.3_FILES from block 6 through 143        }

    rewrite(f,'#5:DOS_3.3_FILES[138]');

    { Write to the last block so the operating system won't crunch  }
    { it when it is closed }

    junk:=blockwrite(f,dir_buffer,1,137);
    close(f,lock);

    { Read Pascal directory }

    unitread(5,dir_buffer,512,2);
    if dir_buffer[30]<>5 then begin
      writeln('ERROR - BYTE 30 <> 5');
      halt;
    end; { if }

    { Set type of DOS_3.3_FILES to bad }

    dir_buffer[30]:=1;

    { Write directory }

    unitwrite(5,dir_buffer,512,2);
  end;  { create_dos_file }

{*****************************************************************************}
{                                                                             }
{ ZERO_PASCAL_DIR                                                             }
{                                                                             }
{ Clear the Pascal directory                                                  }
{                                                                             }
{*****************************************************************************}

procedure zero_pascal_dir;

  var
    dir_buffer: packed array [0..2047] of byte;

  begin { zero_pascal_dir }
    gotoxy(8,0);
    write(chr(eraseos),'Zeroing directory...');

    { Load it... }

    unitread(5,dir_buffer,2048,2);

    { zero it... }

    fillchar(dir_buffer[16],2048-16,chr(0));

    { and write it }

    unitwrite(5,dir_buffer,2048,2);
  end;  { zero_pascal_dir }

{*****************************************************************************}
{                                                                             }
{ CREATE                                                                      }
{                                                                             }
{ Create the disk                                                             }
{                                                                             }
{*****************************************************************************}
```

```
procedure create;

  var
    answer: string;
    i: integer;

  begin { create }
    page(output);
    writeln('Create:');
    writeln;
    writeln(chr(7),'*** WARNING ***',chr(7));
    writeln('This will lose ALL Pascal files that');
    writeln('  are on the disk.');
    write('Continue? (Yes/No) ');
    readln(answer);
    { Convert ANSWER to upper case }
    if length(answer)>0 then
      for i:=1 to length(answer) do
        if answer[i] in ['a'..'z'] then
          answer[i]:=chr(ord(answer[i])-32);
    if answer<>'YES' then exit(create);
    gotoxy(0,1);
    writeln(chr(eraseos));
    writeln('Put Pascal disk in unit #5');
    write('Press <SPACE> to create');
    getcmd([' ']);
    zero_pascal_dir;
    create_dos_file;
    write_dos_dir;
    gotoxy(8,0);
    writeln(chr(eraseos));
    writeln;
    writeln('Bilingual disk created');
  end;  { create }

begin { bilingual }
  repeat
    gotoxy(0,0);
    write(chr(eraseol),'Bilingual: C(reate, Q(uit [1.0]');
    getcmd(['C','Q']);
    if cmd='C' then create;
  until cmd='Q';
end.  { bilingual }
```


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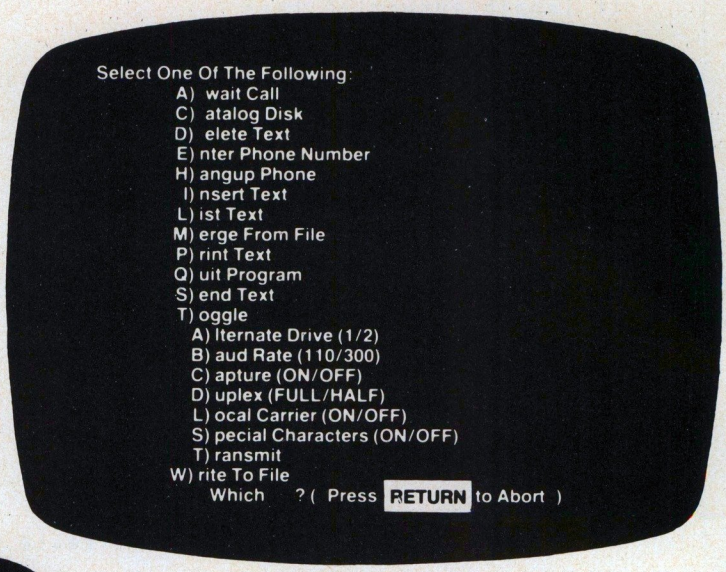

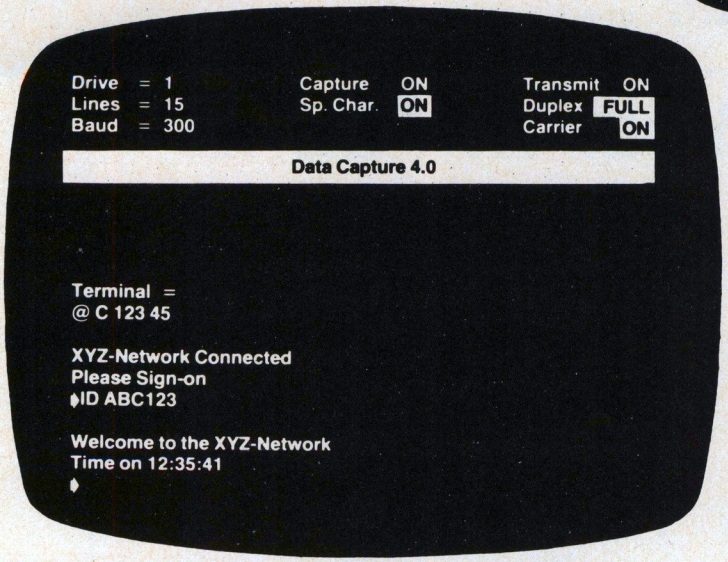

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A Call —A.P.P.L.E. REVIEW:

Selection of A Disk System — Part 2

Dan Paymar

THIS article is a follow-up on "Selection of a Disk System" which appeared in the January, 1982, issue of *Call —A.P.P.L.E.* Since that article was written, but before it was published, the author purchased a disk system. This is a review of how well the selected system satisfies the criteria outlined in the first article. It is suggested that the reader review the first article for definitions of terms used herein.

As predicted in the first article, I finally reached the point where I had to have more on-line storage. Unfortunately, there still seemed to be no system available that met all of my selection criteria, so I had to select the one that appeared to come the closest. (No company has yet responded to my plea for such a system at the end of the first article). Even more unfortunate, the selected system has not yet come up to even the reduced expectations.

The system referred to consists of a Vista A800 controller and two QumeTrak 842 double-sided, double-density, 8″ floppy disk drives. It was purchased from Jade Computer Products complete with a cabinet, power supply, and cables. Here is how the system met (or failed to meet) each of the criteria in the first article:

1. High Data Integrity

The system has been in use for a total of about 500 hours, and until recently there has been no known loss of data in spite of a dry, dusty environment. In the last few days, however, I have had several unrecoverable read errors on drive #2 (more on this under "reliability" below). The Vista controller has no trouble handling the data reliably as long as the system is functioning properly. This is due, at least in part, to the "write precompensation" employed in the FD1797 controller chip.

So far, it seems that this criterion has been satisfied. Still it would be much better if the fan brought air into the Jade cabinet through a filter rather than drawing unfiltered room air in through the front of the disk drives.

2. High Reliability

Although the double-sided, double-density floppys are fairly new, the 8″ floppys have been around for many years. Of course, so have the small Winchester type drives, so there was no clear preference on the basis of reliability at the time the selection was made. However, after about 200 hours of use, one of the Qume drives quit and was sent back to Jade for repairs. Although I called Jade on 1-7-82 for authorization to return the drive for warranty service, and they received it on 1-13-82, it was not until 2-24-82 that a replacement was received. That's seven weeks with only one drive. According to Jade, most of this delay was caused by Qume.

On 3-30-82 this new drive began having frequent read errors, including an occasional unrecoverable error. A call to Jade brought a suggestion to use a head cleaning diskette (which I had already done) or to send the drive back for service. Since the drive was now out of warranty, I decided to pursue the problem first myself. The problem turned out to be a poor connection where the A800 card plugs into the Apple I/O slot. With only four insertions and removals of the card, the gold plating on the A800's edge connector had been worn away! Contact cleaner applied with a swab has cleared up the problem for the time being, but I wonder for how long. There's no excuse for such thin gold plating on a $595 card.

The new drive has a beige and grey front. It's better looking, but was a mismatch next to the older drive with its black front. Although the faulty drive was returned with all jumpers, no configuration jumpers were returned with the new drive. I had to use wire-wrap to configure the drive as required by the A800. A phone call to Jade produced an offer to replace the black front drive with a new beige and grey drive and to include the jumpers for both drives. The new drive arrived within a week, but still no jumpers. The system looks great with drives that match the Apple.

Except for the worn out edge connector, the Vista A800 has been reliable so far. Since the failure of the Qume drive could be attributed to "infant mortality," it's too early to make a judgement on the reliability of the system after only a few hours of actual disk operation. A reliability test routine would have made a meaningful judgement possible.

3. Good Back-up Capability

Having a matched pair of drives with removable media makes it very convenient to make back-up copies. However, the DOS copy program is very slow with a diskette that holds so much data. I am using the Apex operating system which has a much faster copy routine, but you may not be so lucky. Vista says that "the emphasis on speed of back-up is ill-directed," but I have seen many files lost because a user considered it too time consuming to make frequent back-ups. Vista could easily include a fast back-up routine on each of their diskettes. However, I selected the floppy system because there is still no low cost, convenient method of backing up the Winchester disks.

SELECTION OF A DISK SYSTEM — PART 2

4. Easily Maintained

At the time I ordered the system, Jade promised complete schematics, diagnostic and reliability test routines, listings of the modifications to DOS to incorporate the Vista driver, and listings of the firmware code in the Vista card's ROM. So far, I have received excellent manuals on the Qume drives (direct from Qume), a partial schematic of the Vista A800, and nothing on the power supply. Jade says that there are no schematics available for the power supply, and Vista refuses to supply the complete schematics, listings of its software and firmware, or any test routines. Obviously, I would not have selected this system if I had known that beforehand.

Vista claims that they have to withhold that information to protect their design from being copied by competitors, yet there is no copyright notice on any of their diskettes (see 5 below), or on the firmware EPROM. With the recent court rulings indicating that the new copyright law takes precedence over trade secrets on copyrightable materials (which now includes software and firmware), it seems to me that they have less protection than they would if they published complete schematics and listings with copyright notices. But, of course, I'm not an attorney.

Lack of published listings does not prevent competitors from digging into the code to figure it out, or from tracing out a circuit (which I am doing for my own use); it only makes it inconvenient for the user who has a special application requirement or who wishes to service the hardware without the delays inherent in returning it to the manufacturer. Out of necessity, I have already disassembled their FORMAT program so that I could modify the sector sequencing for efficient operation with Apex.

A call to Qume regarding the read errors brought an offer to send current manuals. It was then I found out that a special alignment diskette was needed for servicing the drives. This diskette, Qume part #50152-02, costs $99.50. This price is reasonable for a precision disk, but if you want it shipped in less than 30 to 60 days then there is an additional $50.00 expediting fee (the same goes for replacement parts). Whatever disk system you are considering, be sure that all servicing needs are available to you or to your supplier before you buy the system.

It appears that I am destined to have ongoing problems with this system whenever service is required. Jade and Vista both get very low scores on this criterion. Qume gets a good score except for the shipping delay or expediting fee.

5. Compatible with Existing Software Systems

Vista supplies three 5¼" diskettes with the A800, all in standard Apple formats. These diskettes contain the software modifications for using the A800 with DOS, Pascal, and CP/M. The respective operating systems are not included on the diskettes. You follow very explicit instructions in the Vista manual to combine the driver overlays with your master copy of the respective system. This procedure was easy to follow for modifying DOS and seemed detailed enough to prevent serious errors. I have not tried the Pascal or CP/M versions yet so I can't comment on those, but they should be as easy to use as the DOS version. In single-density mode, the diskettes should be compatible with other systems. The software allows using Pascal or CP/M in either single-density or double-density mode, but DOS can be used only in double-density mode. Except for this minor point, I give Vista a high score on this criterion.

6. DMA Data Transfer and Interrupt Capabilities

According to the Vista manual, all data transfers are by Direct Memory Access; anyway, the data rate required for double-density recording seems to mandate DMA operation. However, I have not yet tried executing code outside of Vista's firmware during a data transfer, and the manual does not say whether the firmware code is interruptable during a data transfer. Therefore, as the reason for wanting DMA operation is to allow concurrent servicing of low speed I/O devices (e.g. a console device, a printer, or a communications interface), it is not yet clear whether the A800 fully satisfies the DMA requirement.

The A800 does not provide interrupts, so it definitely fails to satisfy that criterion. In my correspondence with Vista, they say that interrupts were considered, but not included because no major operating system for the Apple can make use of overlap processing during disk operation. That's true, but they don't seem to realize that such software cannot exist prior to the availability of hardware that will make it possible! A quick review of articles in this and other magazines will reveal the ingenuity of users in utilizing new hardware features.

7. Large Storage Capacity

In double-density mode, each drive has 77 tracks per side, formatted with 30 sectors of 256 bytes each. This totals nearly 1.2 megabytes per drive, or over eight times the capacity of Apple's 5¼" drives with 16 sectors. This will satisfy me for some time to come, and it would probably be sufficient for many small businesses. Future expansion presumably requires only the proper cable to add two more drives. I don't know whether the power supply in the Jade cabinet has the capacity to handle two more drives or whether another (or a larger) supply would be necessary.

8. Quiet Operation

The system is certainly quiet enough not to disturb someone sleeping in the next room, but I find the slight noise of the fan and of the drives themselves to be somewhat annoying with the system sitting on the desk next to the computer. Since rack mountings were not supplied by Jade, I will have to rig up a shelf to mount the system in the desk. Hopefully that will give enough additional sound insulation to reduce the hum. The A800, of course, operates silently.

9. Cost Effective

Jade is currently advertizing this system at $1995 plus shipping, so it is a lot of storage for the money (almost five times the "bytes per buck" provided by Apple's Disk-II). Also, if you feel capable of hooking it up yourself, you might consider the "kit" at $1795. Vista is also offering their V1000 cabinet for use with the A800, but I have no further information on it at this time.

In either case, this system should be cost effective for most users (assuming that there is not excessive down time or repair bills). It is not quite that cost effective for me, however, as I still have to disassemble and decrypt the firmware code in order to interface it to the Apex operating system with optimum efficiency.

Additional Information

This article would not be complete without a summary of the events from the time the system was ordered up to the present. The system was ordered on 9/19/81, shipped on 9/25/81, and received on 10/2/81. The price paid for the system included a $200 differential between the "kit" and the "fully assembled and tested" versions. However, as received:

a) There were no manuals for the disk drives or the power supply, and only a photocopy of a preliminary" manual for the A800 controller.
b) There were none of the promised schematics, listings, or test routines for the A800 controller.
c) Two rubber feet were missing from the bottom of the cabinet. One was found loose in the shipping box, and the other was found *inside a disk drive!*
d) Drive #2 was not bolted to the cabinet on the bottom. One of the four screws was found loose in the shipping box, and the others are still missing.
e) Drive #2 was also missing the spring that ejects the diskette when the door is opened.
f) Drive #1 didn't work at all. Upon running the format program, the message "permanent error" was displayed, and the screen then filled with garbage (apparently the Apple was switched to display page #2).
g) The door release on drive #1 was very stiff and hard to operate. Had to push very hard to open the door.
h) The ribbon cable that connects the drives to the controller was too short with the disk system placed to the right side of the computer (I like my paperwork on the left side when I'm typing).
i) There were many typo errors in the Vista manual. The most serious error was the instruction to BRUN FORMAT DD which did not exist on the diskette. CATALOG revealed a binary file named FORMAT 2.1 which turned out to be the correct program.

At that point, I removed both disk drives from the cabinet to check all jumpers against those specified in the Vista manual. They checked out as correct, so I changed the drive select jumpers to make the drive that was working drive #1. While re-installing the drives in the cabinet, I put a spacer under the back end of the drives to lift them up even with the front, and re-routed the ribbon cable under the drives and out the left side of the cabinet. This gave enough cable length to reach the controller with the cabinet placed to the right of the Apple. Upon retesting the system, lo and behold, both drives now worked!

All in all, it took me over six hours to get the system running, not counting the time that would normally be spent making the DOS modifications. This included several telephone calls to Jade (happily, they have a toll-free number) during which they admitted to not having an Apple system on which to test the disk drives with the A800 controller! So what did my $200 to have the system "fully assembled and tested" pay for?

On December 14, nearly three months after the system was shipped, Jade shipped a box containing an outdated Qume manual (January, 1980), a new Vista manual, an EPROM with new firmware for the A800, three new Vista diskettes (for DOS, Pascal and CP/M), and the missing eject spring. Joy! I no longer have to remove the diskette from drive #2 with tweezers.

While I had the cabinet open to install the eject spring, I followed the excellent directions in the Qume manual to adjust the door release mechanism. However, the new Vista manual says to BRUN FORMAT 2.2, but the file on the new diskette is FORMAT 2.21. Why not just name the file FORMAT and have it display its revision number when it is run? Also, the new Vista manual omits the layout pictures in the section on setting the jumpers in the disk drive and still has many typo errors. If only all manuals were as good as those supplied by Qume.

During the week before Christmas, we made several calls to Vista's toll-free number regarding the sector sequencing and a problem in programming the A800 for single-density mode. They kept promising to call back with the information, but never did. After Christmas, we found out that they were closed until after January 1! They never did call with the sectoring informaton, but in the mean time we disassembled the format routine and figured out how to modify it for use with Apex. They did finally send manufacturer's spec sheets to provide information on the controller chip that was supposed to be in the manual. With a great deal of trial and error we finally got it to work in both the single-density and double-density modes.

At the West Coast Computer Faire I talked with people from Vista who promised to send additional documentation, including timing diagrams and a listing of the firmware. These items have not yet arrived. Yet within a week of my call to Qume, we received a new Maintenance manual dated December, 1981, along with a current Product Specification manual on the QumeTrak drives.

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SELECTION OF A DISK SYSTEM — PART 2

Conclusion

I am still missing part of the A800 schematic (the DMA logic), listings of the software overlays and of the firmware, diagnostic and reliability test routines, and a few screws. Curiously, the introduction in the Vista manual says "For your convenience, Vista has provided complete documentation with your controller." What a laugh. I even offered to sign a proprietary information agreement to get the documentation, but they still refused to supply it. According to Jade, the new EPROM and diskettes that they sent are part of Vista's customer support policy. If so, this is great, but no mention is made of this policy in the Vista manual or warranty or in any of my correspondence with Vista. Also, the Vista manual's introduction says "To make sure you receive all notifications of enhancements to this product ... complete and mail the warranty registration card at the back of this manual." My manual contained no such card!

Disk controllers for minicomputers are generally much larger (up to 200 or more chips) and most come with complete schematics, timing diagrams, reliability test routines, and thorough diagnostic test routines. In spite of the complete documentation and a much higher manufacturing cost, such a controller may cost as little as twice the price of the A800. It seems that makers of microcomputer equipment still have some catching up to do if they want to compete effectively with low end minicomputer systems.

It seems that there still is no disk system available that meets all of my criteria. This system is still expected to come close as long as nothing goes wrong with the controller card, but in the future I'll insist on seeing all of the documentation before making a major purchase. Both the Jade/Qume drive system and the Vista A800 controller are potentially fine products; it's a pity that they are plagued by such easily curable deficiencies.

Preliminary copies of this article were sent to both Jade and Vista. Jade did not respond, but in a phone call they told me that they have greatly expanded their quality assurance efforts and now use an Apple for testing the complete system before shipping. Vista responded with a three page letter criticizing the article (some of it constructive) but no additional help or documentation. Vista also confused reliability with data integrity, combining them into one subject in spite of the clear distinction I drew between these criteria in the original article.

One final annoyance: the rubber feet stuck on the bottom of the Jade case are too small to keep the edges of the sheet metal cover off the desk. Consequently, I now have some large gouges in my desk top. Also, I feel that I should receive a refund of the $200 charge for assembling and testing the system.

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RESPONSE TO SELECTION OF A DISK SYSTEM PART 2

George K. Peck/Software Engineering Manager/Vista Computer Co., Inc.

THANK you for sending us a copy of Mr. Paymar's upcoming article "Selection of a Disk System – Part 2." We admire your magazines practice of publishing the experiences and opinions of some of your readers.

After reading the article, one thing became immediately obvious: Part 2 does not draw a clear distinction between our A800 Disk Controller and the disk drive package. *A fairer way for Mr. Paymar to handle the article would be to evaluate each product separately. As the article now stands, the reader is led to believe that many of the drive related problems are due to some failure of the VISTA Disk Controller. This, in fact, is not the case.*

When all of the drive–induced problems are sifted from the article, it appears that our disk controller measures up to a majority of Mr. Paymar's criterion. There appears to be only two major objections which deal directly with our controller: 1) No direct support of interrupts, and 2) Our refusal to divulge proprietary information.

The first point of contention is due to the lack of interrupt support. This was a design decision and in retrospect, appears to have been an acceptable choice. We have had only one known repercussion to this decision to date....Mr. Paymar!

The other major difficulty deals with the subject of schematics and source code for the software patches. The consultants who provided the designs for both the software and hardware prohibit distribution of their material. They feel, and we at VISTA agree, that work provided and paid for should not be disclosed for others to copy. As you can appreciate, the work done to connect Apple DOS, CP/M, and Pascal were a significant portion of the design of the product. To supply the source for our patches to operating systems for which no sources are available, would be to relinquish part of our competitive advantage.

Early advertising indicated that source and schematics were supplied. This offer was withdrawn at the request of our hardware and software designers. It is unfortunate that some of our dealer's advertising still carries this offer. It takes dilligence and a lot of lead time to get something out of print.

Vista, like Apple Computer and Microsoft, does not provide source listings for its operating systems. Part of the reason for this policy is to avoid the case where users rely on the stability of internal routines. Significant changes become impossible if a large quantity of software is based on the presence of certain routines. An excellent example of this is demonstrated by Apple's Monitor ROM. System monitor enhancements are now essentially impossible due to the great reliance of many programmers on these routines. To offer some relief to this dilemma, Vista has provided and documented fixed entry points for user calls.

In our opinion, Mr. Paymar's editorializing did not take the majority of users into consideration. He fails to realize that most large storage users (8" and otherwise) are merely looking for a solution to the lack of adequate, reliable storage. Their primary concern is compatibility with existing systems and software. They have little or no interest in bringing up other operating systems or in tasks involving large scale programming. To this end, they neither want or need schematics or source listings. We only hope that Mr. Paymar's somewhat jaded (no pun intended) view does not adversely influence those discerning user's for whom our product was designed.

So where does that leave the A800? According to the Paymar standard, in good shape. See for yourself:

1. *High data integrity — We use the most sophisticated data recovery system available: the phase lock loop.*
2. *High reliability — The controller uses a proven design coupled with quality components (the WD1797 FDC).*
3. *Good back–up capability — You almost had us here Dan. We now have a variety of software utilities and are constantly creating more.*
4. *Easily Maintained — YES!! (by our own, and most other user criterion)*
5. *Compatibility with existing operating systems — This is our strong point. We support all three systems (DOS, CP/M, and Pascal).*
6. *DMA data transfer and interrupt capabilities — No interrupts but impressive DMA capabilities. Did you know that we can load an Apple Hi–Res picture in less than a second!*
7. *Large storage capability — The largest! The total storage available per double sided disk is 1,182,720 bytes minus any operating system overhead.*
8. *Quiet operation — Yes, our card is very quiet.*
9. *Cost effective — At the price Mr. Paymar paid we estimate a storage cost of 10.5 millicents per bit versus 47 millicents per bit on a conventional Apple dual disk drive.*

We at VISTA feel that the conclusion at the end of the article is incorrect. The VISTA A800 and our own drive subsystems, the V1000 (with dual, double headed drives) and V1100 (with dual double headed slimline drives), taken together meet each of the nine points of the January article. We're just sorry that Mr. Paymar didn't have a chance to use the entire package as we offer it.

One final thought for Mr. Paymar....a quote from his first article:

"Note that a local store may charge a slightly higher price than a mail order house, but it may be worth it if they help you out when a problem occurs".

Editors note: *We were unable to contact Qume in time for this article; Jade did not respond.*

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"DISK ZAP": CHANGING DOS ERROR MESSAGES

Barton Feroe

This article could be subtitled: "Or What's An Appliance Operator Like You Doing In An October issue of an August Journal Like This?" You see, I have a theory that there are basically two types of Apple Computer owners: the first is the traditional nut. If he were a mad scientist, he'd wear a rumpled white coat and carry around a three day old liverwurst sandwich in his left coat pocket. Since the mad scientist is definitely an endangered species, this Apple User does the next best thing: he leaves the sandwich on the disk drive, which sits jauntily next to the Apple on the right side. To the left, of course, lies reams of program listings (invariably in hexadecimal) scattered in an apparantly random pattern. He's also the type who actually implemented and uses Val Golding's "Printer Driver Subroutine" to run a printer through the game port. Oh, yes, he's got several other printer interface cards, too; but they're not nearly as much fun (or as obscure) as running the printer from the game port.

I'm part of the other group of Apple Users. I'm really quite conventional, don't know a hexadecimal number from a quadratic equation (nor care to know the difference), and hate liverwurst. I am what I like to call an "Appliance Operator", or someone who thinks the Apple is a really neat gadget. I don't really want to know how it works, only that it works and what it does.

So what's an Appliance Operator like me doing in an August Journal like this? As a matter of fact, I'm wondering that, too. Being an Appliance Operator, I really do like to plug things in and operate them. Recently, however, fewer and fewer things have been available to "plug in" and run. So I decided to take it upon myself to write the kind of article that I would like to see in *"Call -A.P.P.L.E."* rather than just wish that someone else would do it.

That brings me to the point (at last!) of this article: something useful to do with "DISK ZAP." Of course, if you are dropping little pieces of three day old liverwurst on *"Call-A.P.P.L.E."* at this point, you really should not go any further with this because it will undoubtedly be too elementary for you. Turn to an article on Pascal. But if you bought A.P.P.L.E.'S "Disk Utility Pack 6-B-16," as I did, just to be daring, and really have had neither the time nor the inclination to do much with it (not to mention any reason to), then this might be just the nifty little article you've been looking for.

It all started when I got a Videx Keyboard and Display Enhancer. Its instructions are so clear and uncomplicated that even I could install it without the slightest difficulty. Once I had it operating, I decided that it would really be nifty if I could modify the DOS error messages so that they would print in lower case. The usefulness of the project? First, it would provide a clear distinction between "RANGE ERROR" and "SYNTAX ERROR" messages generated by DOS vs Integer or Applesoft. Secondly, it would be a nifty way of showing off the lower case capabilities I had added proudly. And, finally, I always wanted to be a published author and thought this might just be my one, brief chance to stand in the spotlight of publication.

First, a brief definition of what this project will accomplish. By writing directly to DOS stored on disk, anytime that particular disk is booted, the DOS error messages will be entered into memory during the booting process in such a way that, once entered into memory, each time a DOS error is encountered, it will be printed out in upper and lower case. Note that this is only one possible application. The brave of heart may go on to invent their own error messages, such as changing "SYNTAX ERROR" to "WHAT'S THAT?" Moreover, if you initialize a disk using this modified DOS, you will have transferred it to the new disk. Best yet, you can use this modified DOS with "MASTER CREATE" to make a new disk a new Master, and/or update previously initialized disks, too.

I first tried to modify DOS to output error messages in lower case using my beloved copy of Beagle Brothers' "DOS BOSS," but discovered early on that it just did not want to have anything to do with lower case. I do not know why. I just know that it did not. Furthermore, if I used "DOS BOSS," I would still not have the ability to create a new Master Disk with the modified DOS. And that brings me to a step-by-step implementation of the direct writing to disk technique that follows.

By the way, if you have neither the Paymar Chip nor the Videx Keyboard and Display Enhancer, you probably won't want to do this modification, since "DISK FULL" would become "D)3+ F5,,." The other error messages become equally incomprehensible, too. If nothing else, it is, at least, consistent.

STEP-BY-STEP INSTRUCTIONS

(1) Boot a DOS 3.3 Master Disk.

(2) Initialize a fresh, scratch disk. I say "scratch" because if this doesn't work, for some reason, at least you will not have ruined one of your good, valuable program disks. Another remedy will be discussed later.

(3) BRUN MASTER CREATE to update the newly-initialized DOS 3.3 "Slave" disk to become a new "Master" disk.

(4) RUN DISK ZAP

(5) Select option "R" (READ) and specify Track 1, Sector 8

(6) Select option "L" (LIST), press the space bar and watch the messages at the right side of the screen. Soon, you will see, in inverse, the DOS error messages, starting with "LANGUAGE NOT AVAILABLE" and ending with "NO BUFFERS ." Note the space in the last position. It is significant and will be referred to again.

"DISK ZAP": CHANGING DOS ERROR

(7) Presuming that all is OK, press the space bar again to return to the menu.

(8) Select option "E" (EDIT). You will now have gone through the mysterious "CALL-151" door and into the Great Abyss. Fear not! We will not leave you there for long.

(9) Now we will do a double-check to verify that we are still "go." Type in the following sequences, every time you see the "*" prompt, followed by return. The numbers you see below will also be on the screen (hopefully).

```
*9695.96A3
9695-   57 52 49
9698-   54 45 20 50 52 4F 54 45
96A0-   43 54 45 C4
```

(10) If your figures agree with the figures above, then you are ready to make changes. We will start with "WRITE PROTECTED" and continue through to "NO BUFFERS." Since the rest of the commands are stored on the next sector (Track 1, Sector 9), some of this will be repeated later.

(11) For each of the subsequent blocks of information, the procedures below should be followed. First, list the block (as above), then make the changes and list it back again, comparing it with the listings given. Since I have always found it exasperating to have to enter long listings, especially in hexadecimal, they will all be kept short.

(12) "WRITE PROTECTED"

ORIGINAL LISTING	CHANGED LISTING
*9695.96A3	*9695.96A3
9695- 57 52 49	9695- 57 72 69
9698- 54 45 20 50 52 4F 54 45	9698- 74 65 20 50 72 6F 75 65
96A0- 43 54 45 C4	96A0- 63 74 65 E4

To type in the first of the above lines, enter 9695: 57 72 69 then hit return.

(13) At this time, at your option, you may either return to the main menu (with CONTROL-Y) and write the change to the disk or you may continue withthe other changes for this sector. If you are a little unsure about things, you might want to go directly to step (22) and return later.

(14) "END OF DATA"

ORIGINAL LISTING	CHANGED LISTING
*96A4.96AE	*96A4.96AE
96A4- 45 4E 44 20	96A4- 45 6E 64 20
96A8- 4F 46 20 44 41 54 C1	96A8- 6F 66 20 44 61 74 E1

(15) "FILE NOT FOUND"

ORIGINAL LISTING	CHANGED LISTING
*96AF.96BC	*96AF.96BC
96AF- 46	96AF- 46
96B0- 49 4C 45 20 4E 4F 54 20	96B0- 69 6C 65 20 4E 6F 74 20
96B8- 46 4F 55 4E C4	96B8- 46 6F 75 6E E4

(16) "VOLUME MISMATCH"

ORIGINAL LISTING	CHANGED LISTING
*96BD.96CB	*96BD.96CB
96BD- 56 4F 4C	96BD- 56 6F 6C
96C0- 55 4D 45 20 4D 49 53 4D	96C0- 75 6D 65 20 4D 69 73 6D
96C8- 41 54 43 C8	96C8- 61 74 63 E8

(17) "I/O ERROR"

ORIGINAL LISTING	CHANGED LISTING
*96CC.96D4	*96CC.96D4
96CC- 49 2F 4F 20	96CC- 49 2F 4F 20
96D0- 45 52 52 4F D2	96D0- 45 72 72 6F F2

(18) "DISK FULL"

ORIGINAL LISTING	CHANGED LISTING
*96D5.96DD	*96D5.96DD
96D5- 44 49 53	96D5- 44 69 73
96D8- 4B 20 46 55 4C CC	96D8- 6B 20 46 75 6C EC

(19) "FILE LOCKED"

ORIGINAL LISTING	CHANGED LISTING
*96DE.96E8	*96DE.96E8
96DE- 46 49	96DE- 46 69
96E0- 4C 45 20 4C 4F 43 4B 45	96E0- 6C 65 20 4C 6F 63 6B 65
96E8- C4	96E8- E4

(20) "SYNTAX ERROR"

ORIGINAL LISTING	CHANGED LISTING
*96E9.96F4	*96E9.96F4
96E9- 53 59 4E 54 41 58 20	96E9- 53 79 6E 74 61 78 20
96F0- 45 52 52 4F D2	96F0- 45 72 72 6F F2

(21) "NO BUFFERS"

ORIGINAL LISTING	CHANGED LISTING
*96F5.96FF	*96F5.96FF
96F5- 4E 4F 20	96F5- 4E 6F 20
96F8- 42 55 46 46 45 52 53 20	96F8- 42 75 66 66 65 72 73 20

(22) Once this has all been entered and checked, you are ready to return to the main menu, via a listing of the sector, with a "CONTROL-Y." If you look closely, you will notice that the listing shows strange, non-lower case inverse characters. Not to worry!

All will be well, provided you have faithfully followed the above directions.

(23) Now's your last chance (almost) to back out. Select the "W" (WRITE) option. Read the message printed and decide if you really do want to write the sector back to the disk. If you are brave of heart, press the "Y" key and it is done. Written to disk. Don't despair! Even if you have *made a disaster*, you were only working on a scratch disk, so no major loss, right?

(24) You are now ready to repeat the process for the second part of the DOS error messages. Assuming you are still in "DISK ZAP," press "R" for READ, then Track 1, Sector 9.

(25) Press "L" (for List) again and you will see (in inverse on the right side of the screen) the rest of the error messages. Once back at the menu, select "E" and edit, following the same rules as before. The only difference is that you will be working on Track 1, Sector 9 rather than Track 1, Sector 8.

(26) "AVAILABLE" – Note: This is the last part of the "NO BUFFERS AVAILABLE" message that started at the end of the last sector.

ORIGINAL LISTING	CHANGED LISTING
*9600.9608	*9600.9608
9600- 41 56 41 49	
4C 41 42 4C	9600- 41 76 61 69
	6C 61 62 6C
9608- C5	9608- E5

(27) "FILE TYPE MISMATCH"

ORIGINAL LISTING	CHANGED LISTING
*9609.961A	*9609.961A
9609- 46 49 4C 45	9609- 46 69 6C 65
20 54 59	20 54 79
9610- 50 45 20 4D	9610- 70 65 20 4D
49 53 4D 41	69 73 6D 61
9618- 54 43 C8	9618- 74 63 E8

(28) "PROGRAM TOO LARGE"

ORIGINAL LISTING	CHANGED LISTING
*961B.962B	*961B.962B
961B- 50 52 4F 47	961B- 50 52 4F 47
52	52
9620- 41 4D 20 54	9620- 61 6D 20 54
4F 4F 20 4C	6F 6F 20 4C
9628- 41 52 47 C5	9628- 61 72 67 E5

(29) "NOT DIRECT COMMAND"

ORIGINAL LISTING	CHANGED LISTING
*962C.903D	*962C.903D
962C- 4E 4F 54 20	962C- 4E 6F 74 20
9630- 44 49 52 45	9630- 44 69 72 65
43 54 20 43	63 74 20 43
9638- 4F 4D 4D	9638- 6F 6D 6D
41 4E C4	61 6E E4

(30) Once again, back to the menu (via the listing) with a "CONTROL-Y." As before, select option "W" (WRITE) and then "Y" and that's it.

Now that the information has been written to the disk, you can now exit DISK ZAP (with a "Q"). If you're feeling confident, simply boot the disk (remember "PR#6," presuming your disk drive is attached to Slot 6?) and then check it out.

(31) To check out "Language Not Available," turn off the power to the Apple and remove your ROM card (I have an Applesoft card, not the Language System), turn on the power, reboot the disk and say "FP" to your Apple. It should respond with the "Language Not Available" error message, only in upper and lower case.

(32) To check out the "Range Error," type "MAXFILES 99." It should respond with the appropriate error message, again in upper and lower case.

(33) For "Write Protected," place a piece of tape over the notch in the disk, replace it in the drive, and type "SAVE WAFFLE." Once DOS has determined that the disk is write protected, you will get an error message.

(34) To check the "End of Data" message, you will have to write and run a short program, such as the following:

```
100 HOME: D$ = "": REM
    CTRL-D
110 PRINT D$;"OPEN TEST"
120 PRINT D$;"WRITE TEST"
130 FOR X = 1 TO 3: PRINT
    X:NEXT
140 PRINT D$;"CLOSE TEST"
150 PRINT D$;"OPEN TEST"
160 PRINT D$;"READ TEST"
170 FOR X = 1 TO 4:INPUT
    X:NEXT
```

(35) For "File Not Found," simply ask the disk to load a program which is not on the disk.

(36) For "Volume Mismatch," simply ask the disk to "LOAD ANYNAME,V222" presuming that the volume number of the disk in the drive is not 222.

(37) For "I/O Error," simply lift the door of the disk drive and ask for a CATALOG.

(38) If you want to look at the "Disk Full" message, save a program that is too large for the remaining space on a disk.

(39) "File Locked" will pop up if you want to delete a file from the disk that is locked.

(40) "Syntax" will pop up if you change one of the valid disk commands in the little demonstration program from step (34) above to one that is invalid. Change "OPEN" to "OREN," for example. when you run the program, you will, indeed, get an upper and lower case "Syntax Error" message.

(41) The "No Buffers Available" message gave me a problem. I finally got it to pop up by setting "HIMEM:" to 3702 and asking for a CATALOG.

(42) "Program Too Large" will appear by attempting to load any moderate-sized program into the Apple with HIMEM set to 3072. To restore HIMEM to its original (or normal) place, type "FP."

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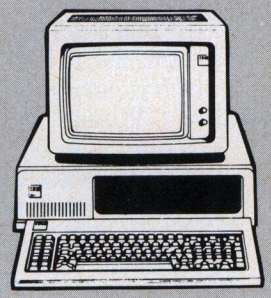

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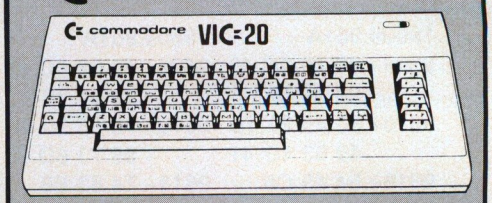

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"DISK ZAP": CHANGING DOS ERROR

(43) The last error message, "Not Direct Command," will crop up by a simple typing of "OPEN FILE."

Remember early on I mentioned that if this turned out to be a total disaster, there was a way to recover that I would refer to later? It is now later. During my experiments, I discovered at one point that I had made a mess. I found two ways of getting out of the jam I made for myself.

The first time I goofed, I "backed out" of my problem by reading in Sector 1, Track 8 of a disk that I knew was good. I then replaced the good disk with the bad one and wrote the "good" information directly to the same Track and Sector, but on my bad disk. It worked.

My second error, however, was a real mess. Somehow I managed to write my changes to an entirely wrong sector. This time, I had no choice but to recreate DOS from the ground up. I discovered that it was easier to BRUN "MASTER CREATE" than it was to re-initialize the disk, and start over from that point.

Once again, the worst that is going to happen (most likely) is that you will lose time and data from a diskette. Even so, you may not lose all your experimenting. Once completed, of course, you can transfer your modified DOS to any existing disk simply by doing the following:

(1) BLOAD Master Create (from the DOS 3.3 System Master that came with DOS 3.3)

(2) Remove that system master from the drive.

(3) Place the disk that contains your modified DOS in the drive and type "CALL 2051." The whirring sound that you hear is the loading of your modified DOS into the memory that will be used to update the other disks.

(4) Follow the directions supplied by Master Create, making sure to put the correct greeting program name for each disk that you update.

So you have it: what is probably the first venture some of us have had with that strange and interesting "DISK ZAP" program. There are, of course, other applications. One that comes to mind immediately is the direct writing of file names (using inverse, flashing, lower case, and even control characters) directly to the volume table of contents residing on Track 17, Track 15 (decimal).

If you have a hankering to pursue this just a little further, you can apply the same technique to that "DISK VOLUME" header at the top of the catalog. If you wish to change that to upper and lower case, read Track 2, Sector 2 into memory using Disk Zap. Enter the edit mode and, as before:

ORIGINAL LISTING	CHANGED LISTING
*96B0.96BA	*96B0.96BA
96B0- C5 CD D5	96B0- E5 ED E5
CC CF D6 A0 CB	EC EF D6 A0 EB
96B8- D3 C9 C4	96B8- F3 E9 C4

A Side Note: Remember doing the error messages earlier? This message differs in that it reads backwards. In other words, if you look at the listing, it will spell out "emuloV ksiD." Once again, I have no idea why it is that way. All I know is that it is that way.

For further information on this particular use, let me refer you to "BENEATH APPLE DOS" (also available from A.P.P.L.E.). While I do not pretend to understand even half of that volume, there are some excellent nuggets of information for Appliance operators.

Example: did you know that besides file types "T" (Text), "I" (Integer Basic), "A" (Applesoft), and "B" (Binary, or machine language), there are also: "R" (Relocatable - you have seen this one before if you have the DOS TOOLKIT), "S" (for who knows what), plus an additional "B" and "A" type file. Take a look at page 4-6 of "Beneath Apple DOS."

How you would ever be able to tell that mysterious "A" and "B" from the normal "A" and "B" is also beyond me. But I do have an Appliance Operator's answer to how to spot them if they ever do pop up. Once again, applying the same techniques as before, will be immediately obvious.

If you would like to do that, too, here's the technique. Using the beloved "DISK ZAP," read in Track 2, Sector 2.

ORIGINAL LISTING	CHANGED LISTING
96AE.96AF	*96AE.96AF
96AE- C1 C2	96AE- E1 E2

And, of course, it will be written back to the same track and sector.

I would be fascinated to know if anyone inside or outside of Apple Computer, Inc. would tell us what any of those means. But I leave that to another appliance operator.

Come to think of it, I have suddenly developed a craving for liverwurst. Do you think it's contageous?

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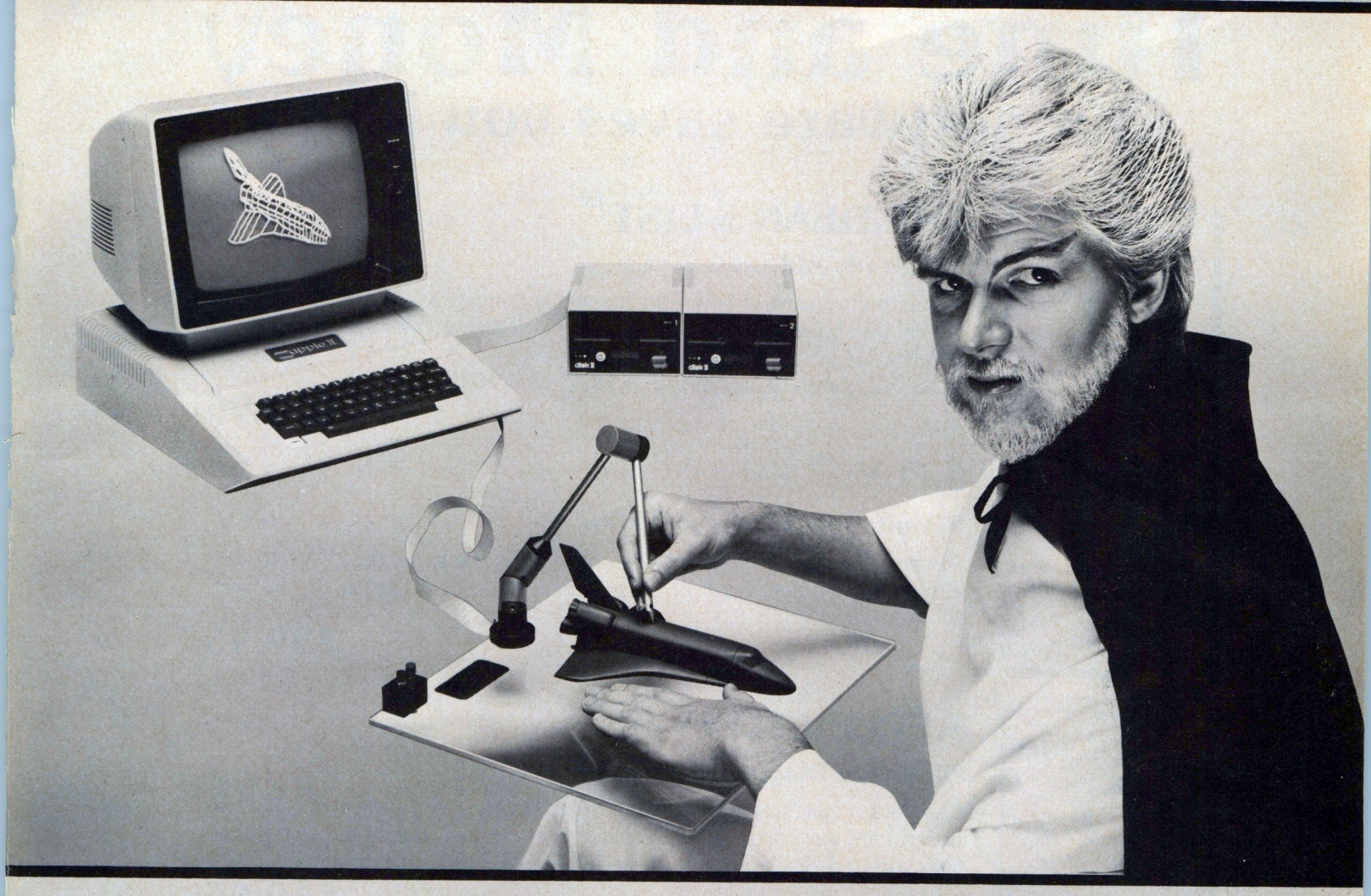

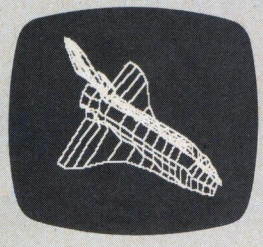

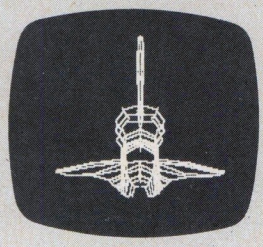

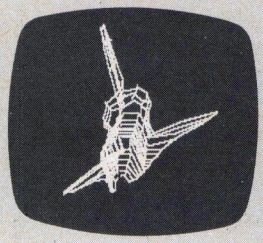

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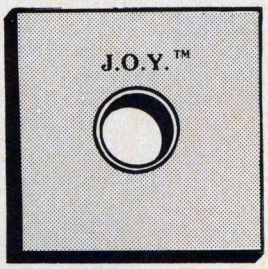

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A Call —A.P.P.L.E. UTILITY:

IN THE DUMPS

Val J. Golding

SOMETIMES it's more fun to write about how a program came to be written than how it works. Here we'll try to do a bit of each. Monitor Utility came about as an improvement to Binary to Text Converter, which was published in the July 1982 *Call -A.P.P.L.E.*, itself an enhancement to a program written by Dave Lingwood for the sole purpose of sending a binary program over the phone to us. From such little appleseeds, however, do big apple trees grow. The principal enhancement was to add the capability of saving it as a binary or text file. In the latter case, it could later be EXECed into memory.

Here's where the reader gets into the act. We had received a letter asking for a simple and easy to use utility that, in addition to doing a memory dump, would also output a "translation" to the equivalent ASCII characters. So far so good, we thought, so we wrote a simple menu to select either a straight hex dump or a hex/ASCII dump, then the thought hit us: let's also offer the option of outputting this data to the video screen or a printer. All well and good.

Let's sidestep the main issue for a moment. We want to expand a trifle on one of our own ideas. We don't know really whether or not this is good programming practice, but when we start a program, we almost always write the menu first, if there is to be one. Why? Because it locks you into your basic design. It forces you to adhere to your commitment. When the hour is late and nothing seems to run, it is real easy to say "well, I really didn't need that module...", but there is a psychological benefit in having it there on the menu. The physical act of making changes to the menu differs little whether we add an item or whether we delete one, but the psychological effect of deleting a feature (which lessens the value of the program) is quite different from adding a feature, which of course results in a better and more useful program.

A second and different aside, one which involves certain assumptions on the programmer's part: how do we format the ASCII display? In a memory dump we can encounter three forms of hexadecimal data:

1. Actual 6502 machine language
2. Hex data or tables to be used by an assembler program
3. Hex representation of ASCII characters

The first two we can pretty much ignore (maybe they'll go away?) and concentrate instead on how the user might like to see his ASCII characters displayed.

The hex representation of the ASCII characters can be in two forms, with the high bit set or clear. If the high bit is clear, the hex value will be in the range $00–$7F (0–127 decimal) and likely will be text from an Applesoft program. If the high bit is set (on), the values will be in the range $80–$FF (128–255 decimal) and probably generated by monitor, Integer Basic or an Assembly program. DOS further generates characters in both ranges.

The Apple's screen display is completely different. If the high bit is clear, screen output will be either flashing or inverse, depending on value. If it is set, output will either be a control (non-printing) character (in the range $80–$9F) or normal, $A0–$FF.

Video display has been explained in greater detail in "Through the Looking Glass," *Call -A.P.P.L.E.*, February, 1982. Our problem is to decide on how to display the characters in a manner that will be most useful and meaningful to the user. Our decision was to display all characters as normal, except for control characters, which would be in inverse. In addition, because hex zeroes are so often found, we convert $00 and $80 (which would show as an inverse at sign (@) to a less prominent period. We wrote the required modifications, tested the program and had it running properly.

Next stage. We had on hand a short utility by Paul Brown, whose purpose was to do a monitor disassembly from BASIC. The accompanying text was in fact set in type at this time when the thought struck us: why not add a disassembler option to the program we had just finished. (Poor Paul, now we are going to reject his article and the accompanying check. Well, we'll at least get him an advance copy of this utility to help compensate.)

As another aside, the following emphasizes the member help member concept. In each issue of *Call -A.P.P.L.E.* we print a list of our consultants. These are individuals who volunteer their time and expertise to help others. You should feel free to call on them.

Now to provide two excellent examples of one our original credos: members help members.

We had run into a problem, not by any means insurmountable, in the ASCII dump module, but it would have meant another two or three hours of debugging and experimentation to resolve. These were hours that we simply did not have; we have other responsibilities such as getting the magazine out on time. Thus we called on David Sparks who at that time was chomping at the bit for a piece of the action, which we (gratefully) gave him. Problem one solved.

Once again we put together and produced a correctly running program, then tackled the addition of adding the disassembler module. We sat down and wrote a few lines of code in the BASIC program and tested it. All worked well — until we tried to write to a text file, instead of the screen. At this point we got a combination of correct disassembly, bits and pieces of an ASCII dump and some pure garbage. Plus, depending on circumstances, the file would not necessarily get written. On top of this, our IDS-460 printer was on the critical list (and in fact was in the hospital for seven weeks just to replace the main logic board), and if you have ever tried to debug a fairly complex program without a hardcopy listing, well, good luck!

IN THE DUMPS

So we called on our good friend and east coast DOS consultant, Billy Steinberg and presented our problem. Billy analyzed what was going on and determined that there was a zero page conflict between DOS and the disassembler routine, so it was necessary to make a temporary modification to DOS and save some registers each pass through the program. He also discovered and corrected a basic flaw in the assembler module that we had overlooked.

We have at this point received the additional information and corrections required to finish our program; the remaining step was to just comment it, test it thoroughly and prepare it for publication. But wait. What about additional enhancements. Given a program that does a hex dump, a hex/ASCII dump and a disassembly to video, disk or printer, what more could be done? How about a memory search? Yes. First rate idea. But at the same time, we are approaching (in August) our October issue deadline. The time element works against us. A search module which could be called prior to invoking one of the other routines would really make this a powerful utility, but this we must leave to the reader's ingenuity. The search routine by Dave Garson in A.P.P.L.E.'s Diskpak 6B-16 really fills the bill. It could be incorporated into this utility without a great deal of effort. Alternatively, Anthony Rose's "Find It" in this issue could well serve the purpose. In fact, to the *member* who submits the earliest postmarked modification as outlined above, we will award $100 worth of A.P.P.L.E. software or publications. How's that for a deal!!

As to the program itself — potential enhancers take note — the code is in the form of DATA statements and is 100% relocatable. This is an absolute requirement, so that the user may modify the BASIC program without consequence. The premise is that the DATA and READ statements rely on the setting of the high order byte of the free memory pointer (110 decimal) plus two pages (512 bytes) of safety margin to provide an area for the relocatable machine code to reside and run in.

The aspect of using DATA and READ statements makes it possible for the BASIC programmer, who knows nothing whatsoever of assembly language, to enter and modify, without repercussions, only a BASIC program. We provide the assembly language source code as an aid to those who understand assembly and may wish to to make assembly language enhancements. It is also a simple matter to write a one line BASIC statement that will read the machine code and convert to a formatted DATA statement that can be traced over and added to the BASIC program. This is indeed the technique we used in writing the DATA statements. The idea is to BLOAD the relocatable assembly program to a known address (let's assume $1000), then write a BASIC program line similar to the following:

```
1 PRINT " 900 DATA";:FOR I =
  4096 TO 4136 : PRINT PEEK (I)
  ",";: NEXT
```

which will print a decimal decode of the machine language that can be traced over with the right arrow key and added to the BASIC program.

The BASIC program is reasonably well divided into modules, each with its own purpose and the assembly program is well commented. Have at it!

```
]LIST

10  REM

MONITOR UTILITY BY VAL J GOLDING
    WITH  WILLIAM STEINBERG

  CALL -A.P.P.L.E. : OCT. 1982

100  REM

INITIALIZE

110 ASFLAG = 767: TEXT : HOME : VTAB
     4: PRINT "      MONITOR DUMP
     UTILITY": PRINT
120 D$ =  CHR$ (13) +  CHR$ (4): REM


200  REM

MENUS

210  PRINT : PRINT "OPTIONS": PRINT
     : HTAB 4: PRINT "INPUT": HTAB
     6: PRINT "A ASCII/HEX DUMP
     :": HTAB 6: PRINT "H HEX DUM
     P ONLY    :": HTAB 6: PRINT "
     D DISASSEMBLY      :": PRINT
     : HTAB 16: INVERSE : PRINT "
      SELECT :";: NORMAL
220  PRINT " ";: GET IN$: PRINT I
     N$: IF IN$ = "D" THEN D = 1
230  POKE ASFLAG,0: IF IN$ = "H" THEN
     IN$ = "A": POKE ASFLAG,1
240  PRINT : PRINT : HTAB 4: PRINT
     "OUTPUT": HTAB 6: PRINT "D D
     ISK              :": HTAB 6: PRINT
     "P PRINTER          :": HTAB
     6: PRINT "V VIDEO
     :": PRINT : HTAB 16: INVERSE
     : PRINT " SELECT :";: NORMAL
250  PRINT " ";: GET OUT$: PRINT
     OUT$: REM

300  REM
GET HEX ADDRESSES

310  PRINT : INPUT "HEX START ADD
     RESS?      : ";H$
320  IF  LEN (H$) < 4 THEN H$ = "
     0" + H$: GOTO 320
330 H$ = "0:" +  RIGHT$ (H$,2) +
     " " +  LEFT$ (H$,2) + " "
340  INPUT "HEX END ADDRESS?
       : ";HX$
350  IF  LEN (HX$) < 4 THEN HX$ =
     "0" + HX$: GOTO 350
360 H$ = H$ +  RIGHT$ (HX$,2) + "
      " +  LEFT$ (HX$,2) + " N D9
     C6G": GOSUB 800
370 BP = ( PEEK (110) + 2) * 256
380  GOSUB 600: REM
400  REM
```

```
INITIALIZE OUTPUT ROUTINES

410  ON OUT$ = "D" GOSUB 2500: ON
     OUT$ = "P" GOSUB 2000: ON D >
     0 GOTO 1000
420  CALL BP: GOTO 1500: REM CALL
      M/L FOR HEX/ASCII

600  REM

STUFF MACHINE CODE INTO MEMORY

610  FOR I = 0 TO 131: READ J: POKE
     (BP + I),J: NEXT
620  POKE BP + 119,(BP + 256) / 2
     56
630  FOR I = 0 TO 29: READ J: POKE
     (BP + 256 + I),J: NEXT : RETURN
     : REM

800  REM

STUFF HEX ADDRESSES INTO $0-3

810  FOR I = 1 TO  LEN (H$): POKE
     511 + I, ASC ( MID$ (H$,I,1)
     ) + 128: NEXT : POKE 72,0: CALL
      - 144: RETURN : REM

1000  REM

DISASSEMBLER MODULE

1010  IF OUT$ = "D" THEN  CALL BP
      + 118
1020  POKE 58, PEEK (0): POKE 59,
      PEEK (1)
1030  CALL 63696
1040  CALL BP + 124
1050 ND =  PEEK (2) +  PEEK (3) *
     256:PTR =  PEEK (58) +  PEEK
     (59) * 256
1060  ON ND )  = PTR GOTO 1030: IF
     D THEN  POKE 47033,189: PRINT

1500  REM

EXIT ROUTINES

1510  PRINT : IF PR THEN  PRINT D
     $"PR#0"
1520  IF OUT$ = "D" AND  PEEK (AS
     FLAG) THEN  PRINT "3D0G"
1530  IF OUT$ = "D" THEN  PRINT D
     $"CLOSE"
1540  END : REM
2000  REM

PRINTER ROUTINES

2010  PRINT : PRINT "ENTER PRINTE
     R SLOT OR BINARY DRIVER CALL
     ": INPUT PR
2020  ON PR ( 8 GOTO 2030: CALL P
     R: RETURN : REM
TURN ON BINARY DRIVER
2030  PRINT D$"PR#"PR: RETURN :::
     :: REM  REGULAR SLOT

2500  REM

OPEN DISK FILE

2510  INPUT "TARGET DRIVE (1/2) ?
        ";D2$: INPUT "FILENAME
     TO SAVE        ";F2$: ON  NOT
      VAL (D2$) OR  VAL (D2$) > 2
      GOTO 2510: IF F2$ = "" THEN
     2510
2520  PRINT D$"MONO"D$"OPEN"F2$",
     D"D2$D$"WRITE"F2$
2530  IF  PEEK (ASFLAG) THEN  PRINT
     "CALL-151": REM TO EXEC THE
     FILE LATER
2540  RETURN : REM

3000  REM

DATA STMTS ARE RELOCATABLE ASMBLY

CODE TO BE READ INTO MEMORY

3010  DATA 164,1,166,0,169,141,32
     ,237,253,32,64,249,160,0,132
     ,4,162,7,169,186,32,237,253,
     169,160,32,237,253,177,0,149
     ,5,202,32,218,253,165,0,197,
     2,165,1,229,3,144,4,230,4,20
     8,12,230,0,208,2,230,1,165,0
     ,41,7,208
3020  DATA 217,138,48,16,169,160,
     32,237,253,32,237,253,32,237
     ,253,149,5,202,16,242,169,16
     0,32,237,253,162,7,173,255,2
     ,208,20,181,5,9,128,201,160,
     176,6,233,127,208,2,169,174,
     32,237,253,202,16,236,165,4,
     240,139,96
3030  DATA 169,0,141,185,183,96,3
     2,83,249,133,58,132,59,96
3040  DATA 170,165,44,72,165,45,7
     2,165,46,72,165,47,72,138,32
     ,0,189,104,133,47,104,133,46
     ,104,133,45,104,133,44,96
```

```
      ************************************
2     *                                  *
3     *      Hex/ASCII Dump and          *
4     *   Disassembler Utility  by       *
5     * Val J Golding, David Sparks,     *
6     * Dave Lingwood, Wm. Steinberg     *
7     *                                  *
8     * with some subroutines            *
9     * Stolen from Apple's monitor      *
10    *                                  *
11    * This code fully relocatable      *
12    *                                  *
13    * Call -A.P.P.L.E. : Oct. 1982     *
14    *                                  *
      ************************************
16    *
17    STADR     =     $00
18    NDADR     =     $02
19    FLAG      =     $04
20    BUF       =     $05
21    LMNEM     =     $2C
22    PCL       =     $3A
23    ASCFLAG   =     $2FF
24    DISAB     =     $B7B9
25    RWTSMAIN  =     $BD00
26    PRNTYX    =     $F940
27    PCADJ     =     $F953
28    PRBYTE    =     $FDDA
29    COUT      =     $FDED
30    *
31    *
32              ORG   $1200
33    *
34    *
```

IN THE DUMPS

```
1200: A4 01      35 NEWLINE LDY  STADR+1    ;Get start
1202: A6 00      36         LDX  STADR      ;address
1204: A9 8D      37         LDA  #$8D       ;and c/r
1206: 20 ED FD   38         JSR  COUT       ;Print c/r
1209: 20 40 F9   39         JSR  PRNTYX     ;Print address
120C: A0 00      40         LDY  #0         ;Initialize
120E: 84 04      41         STY  FLAG       ;Flag
1210: A2 07      42         LDX  #$07       ;and counter
1212: A9 BA      43         LDA  #":"
1214: 20 ED FD   44         JSR  COUT       ;Print colon
1217: A9 A0      45 DATAOUT  LDA  #$A0
1219: 20 ED FD   46         JSR  COUT       ;Print space
121C: B1 00      47         LDA  (STADR),Y  ;Get byte
121E: 95 05      48         STA  BUF,X      ;Park in buffer
1220: CA         49         DEX             ;Keep count
1221: 20 DA FD   50         JSR  PRBYTE     ;Output byte
1224: A5 00      51         LDA  STADR      ;Check to
1226: C5 02      52         CMP  NDADR      ;see if
1228: A5 01      53         LDA  STADR+1    ;start < end
122A: E5 03      54         SBC  NDADR+1
122C: 90 04      55         BLT  NXTBYTE    ;Only continue if less than
122E: E6 04      56         INC  FLAG       ;Flag >= result
1230: D0 0C      57         BNE  SPACEOUT   ;Halt output of bytes
1232: E6 00      58 NXTBYTE  INC  STADR      ;Bump start
1234: D0 02      59         BNE  MOD8CHK
1236: E6 01      60         INC  STADR+1
1238: A5 00      61 MOD8CHK  LDA  STADR
123A: 29 07      62         AND  #$07
123C: D0 D9      63         BNE  DATAOUT    ;Not done with line yet
123E: 8A         64 SPACEOUT TXA             ;Check counter
123F: 30 10      65         BMI  ASCIDUMP   ;Skip if 8 bytes outputted
1241: A9 A0      66         LDA  #$A0
1243: 20 ED FD   67 PUTSPA   JSR  COUT       ;Print
1246: 20 ED FD   68         JSR  COUT       ;three
1249: 20 ED FD   69         JSR  COUT       ;spaces
124C: 95 05      70         STA  BUF,X      ;and pad buffer
124E: CA         71         DEX             ;Repeat
124F: 10 F2      72         BPL  PUTSPA     ;until x is negative
                 73 *
1251: A9 A0      74 ASCIDUMP LDA  #$A0       ;Output a space
1253: 20 ED FD   75         JSR  COUT
1256: A2 07      76         LDX  #$07       ;Counter
1258: AD FF 02   77         LDA  ASCFLAG
125B: D0 14      78         BNE  NOASC
125D: B5 05      79 ASC      LDA  BUF,X      ;Get byte
125F: 09 80      80         ORA  #$80       ;Make it legal
1261: C9 A0      81         CMP  #$A0
1263: B0 06      82         BGE  NOTCTRL
1265: E9 7F      83         SBC  #$7F
1267: D0 02      84         BNE  NOTCTRL
1269: A9 AE      85         LDA  #"."       ;Replace @ with .
126B: 20 ED FD   86 NOTCTRL  JSR  COUT       ;Print legal byte
126E: CA         87         DEX             ;Repeat 8 times
126F: 10 EC      88         BPL  ASC
1271: A5 04      89 NOASC    LDA  FLAG       ;Check flag
1273: F0 8B      90         BEQ  NEWLINE    ;Repeat if clear
1275: 60         91         RTS             ;else all done
                 92 *
                 93 *
1276: A9 00      94         LDA  #$0        ;Trick- POKE it from BASIC
1278: 8D B9 B7   95         STA  DISAB      ;Make RWTS call BP+256
127B: 60         96         RTS
                 97 *
127C: 20 53 F9   98         JSR  PCADJ      ;CALL BP+124 from BASIC
127F: 85 3A      99         STA  PCL        ;Next adr to disassemble
1281: 84 3B     100         STY  PCL+1      ;Get it in A and Y
1283: 60        101         RTS
                102 *
                103         DS   122
                104 *
12FE: AA        105         TAX             ;Save I/O block pointer
12FF: A5 2C     106         LDA  LMNEM      ;Save registers 'cause
1301: 48        107         PHA             ;DOS and disassembler both use 'em
```

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```
1302: A5 2D      108          LDA  LMNEM+1
1304: 48         109          PHA
1305: A5 2E      110          LDA  LMNEM+2
1307: 48         111          PHA
1308: A5 2F      112          LDA  LMNEM+3
130A: 48         113          PHA
130B: 8A         114          TXA
130C: 20 00 BD   115          JSR  RWTSMAIN    ;Now we call RWTS
130F: 68         116          PLA               ;and restore the registers
1310: 85 2F      117          STA  LMNEM+3
1312: 68         118          PLA
1313: 85 2E      119          STA  LMNEM+2
1315: 68         120          PLA
1316: 85 2D      121          STA  LMNEM+1
1318: 68         122          PLA
1319: 85 2C      123          STA  LMNEM
131B: 60         124          RTS

--End assembly--

284 bytes

Errors: 0
```


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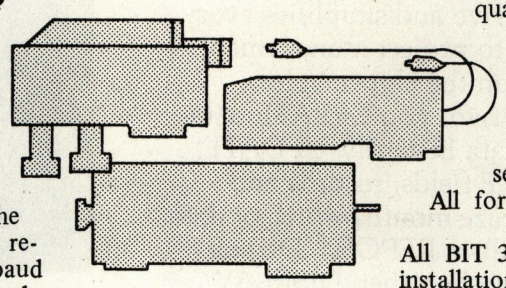

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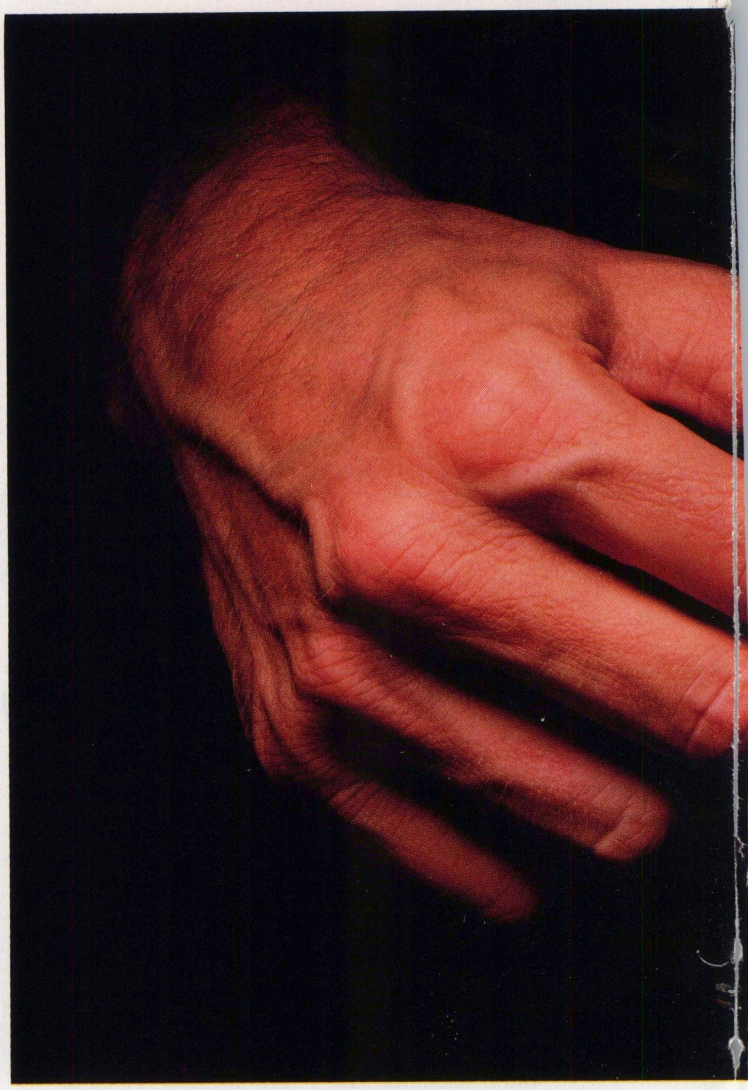

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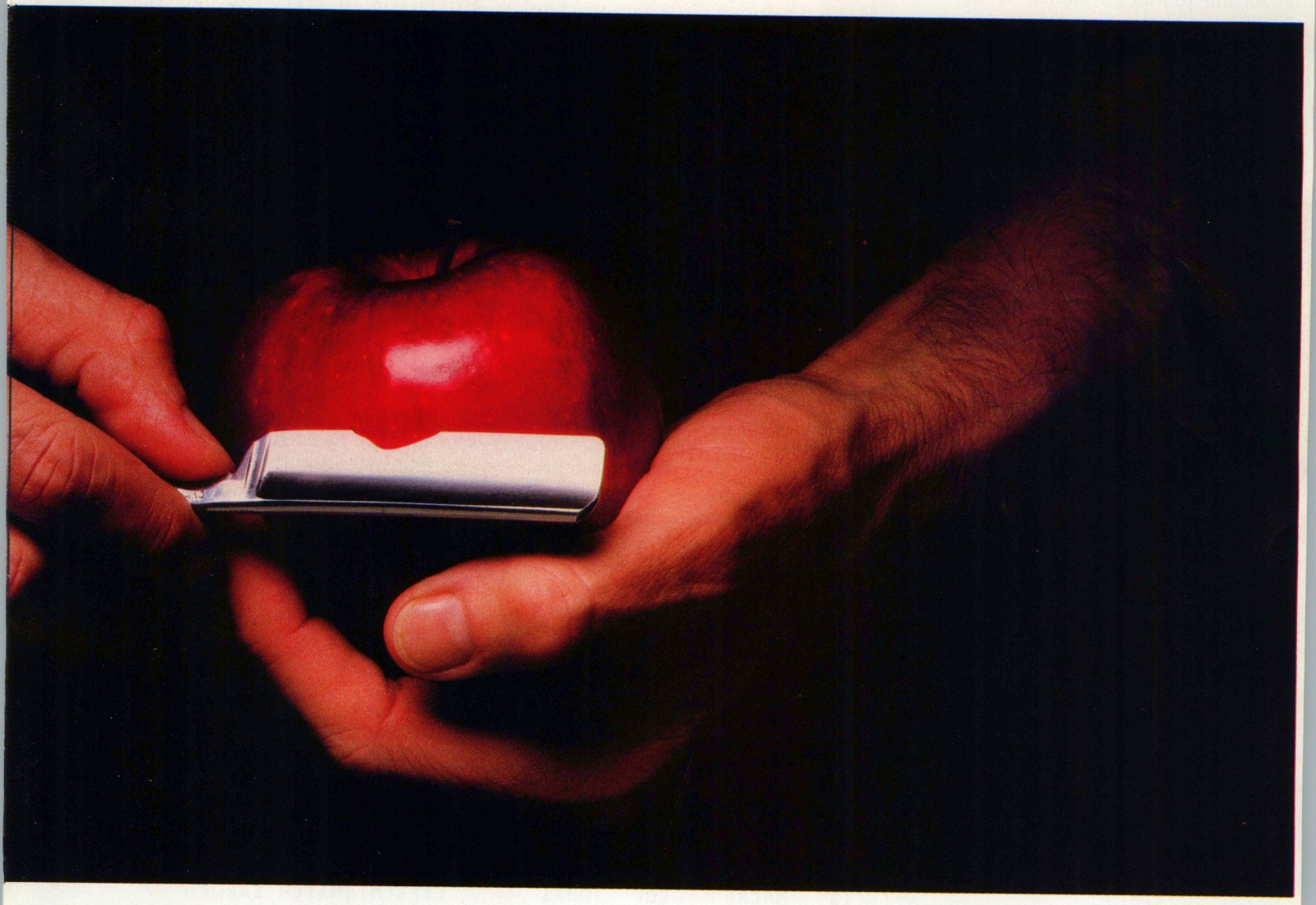

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PASSING ARRAY NAMES

Robert D. Purves

MOST high level programming languages, with the deplorable exception of BASIC, allow you to pass the name of an array as a parameter to a subroutine. This means that you can write the subroutine (perhaps a sorting routine, a matrix inverter, a differential equation solver or just a special data-printing routine) to operate on an array named, for example, DUMMY. When you come to include this routine in a program and you want it to operate on an array with a different name such as A, you simply "send" it the new name as a parameter. In Fortran one might write CALL SORT (A). The parameter A in effect tells the subroutine to replace each mention of the array-name DUMMY by the name A.

Since Applesoft lacks this very desirable feature, when we want a subroutine to operate on an array, we must ensure that the subroutine and the main calling program are using the same array name. In the example above, we would have either to use the name DUMMY throughout the main program, or to edit the subroutine so as to replace each occurrence of DUMMY by A.

More serious problems arise if we should want to perform the sort or matrix inversion etc. on several different arrays within the one program. One solution might be to have multiple copies of the subroutine, with the name DUMMY in each copy replaced by the name of one of the arrays to be processed (A, B, C. etc.). This does not seem very attractive, because of the wasteful re-duplication of code.

Another approach would be to have only one version of the subroutine (with the name DUMMY) and to make an element-by-element copy of the array to be processed into DUMMY just before calling the routine. Immediately on exit, DUMMY would be copied back into the original array. This is very wasteful of code, but array copying is time-consuming and there may still be memory problems, since DUMMY must be dimensioned greater than or equal to the size of the largest array in the program.

These difficulties represent for me the most serious defect of Applesoft, much worse than the lack of the structured statements DO..WHILE.. and IF..THEN..ELSE. Attempts to convert into Applesoft programs originally written in Fortran, Pascal, Algol or PL/1 often come to grief because these languages make extensive use of array parameters in subroutine calls.

The 56 byte machine code utility of Listing 1 overcomes all these problems and allows an Applesoft subroutine to operate on any number of differently—named arrays, with negligible overhead in execution time and memory. There are no restrictions on size or dimensionality, and it works for real, integer, and string arrays. As the name SWITCH suggests, the utility exchanges two arrays. Instead of exchanging the "data" portions of the array variables, it works by locating the names of the arrays in memory and swapping the name bytes. Thus CALL SWITCH,A,DUMMY locates the two arrays A and DUMMY and interchanges their names. Any references to DUMMY (e.g.PRINT DUMMY (3)) now refer to memory locations originally belonging to A, and *vice versa.* The subroutine can now be called to manipulate DUMMY. On exit, a second CALL SWITCH, DUMMY,A restores the original naming (the order of the two names in the CALL statement is irrelevant).

The assembler listing in Fig. 1 needs little explanation. It makes use of various routines documented by J. Crossley in *"Call - A.P.P.L.E. In Depth, No. 1, All About Applesoft."* The checking for arrays of the same type is made by exclusive ORing the two first bytes and then the two second bytes of the names. A non-zero result in the most significant bit indicates variables of different types; this is picked up by the BMI instructions which redirect control to Applesoft's error routines.

Figure 1

```
                ********************************
                *                              *
                *   SWITCH  by R. D. Furves    *
                *                              *
                * Call -A.P.P.L.E. : Oct. 1982 *
                *                              *
                ********************************
                *
VARNAM    EQU   $81          ;Variable name
VARPNT    EQU   $83          ;Use as temp storage
LOWTR     EQU   $9B          ;Array address from GETARYPT
MMERR     EQU   $DD76        ;TYPE MISMATCH ERROR
CHKCOM    EQU   $DEBE
GETARYPT  EQU   $F7D9        ;Find addr of array-name
*
          ORG   $300         ;May start anywhere
*
0300: 20 BE DE    JSR   CHKCOM       ;Check for comma
0303: 20 D9 F7    JSR   GETARYPT     ;Get addr of 1st var name
0306: A5 9B       LDA   LOWTR
0308: 85 83       STA   VARPNT       ;Save address
030A: A5 9C       LDA   LOWTR+1
030C: 85 84       STA   VARPNT+1
030E: A5 81       LDA   VARNAM
0310: 48          PHA                ;Save variable name
0311: A5 82       LDA   VARNAM+1
0313: 48          PHA
```

```
0314: 20 BE DE   28              JSR  CHKCOM       ;Check for comma
0317: 20 D9 F7   29              JSR  GETARYPT    ;Get addr of 2nd var name
031A: 68         30              PLA              ;Recover 1st name (hi byte)
031B: A8         31              TAY              ;Save until after comparison
031C: 45 82      32              EOR  VARNAM+1
031E: 30 15      33              BMI  TYPMM       ;Names must have same sign
0320: 68         34              PLA              ;Recover 1st name (lo byte)
0321: AA         35              TAX              ;Save until after comparison
0322: 45 81      36              EOR  VARNAM
0324: 30 0F      37              BMI  TYPMM
0326: 98         38              TYA
0327: A0 01      39              LDY  #1          ;Index for loop
0329: 91 9B      40   LOOP       STA  (LOWTR),Y   ;Swap names
032B: B9 81 00   41              LDA  VARNAM,Y
032E: 91 83      42              STA  (VARPNT),Y
0330: 8A         43              TXA
0331: 88         44              DEY
0332: 10 F5      45              BPL  LOOP        ;Both bytes of names done?
0334: 60         46              RTS              ;Return to BASIC
                 47   *
0335: 4C 76 DD   48   TYPMM      JMP  MMERR       ;TYPE MISMATCH ERROR
--End assembly--      56 bytes          Errors: 0
```

Figure 2

```
]LIST

10  REM

    SWITCH BY R. D. PURVES

CALL -A.P.P.L.E. : OCT. 1982

100  REM
          POKE INTO MEMORY

130 SWITCH = 768: FOR J = SWITCH TO
     SWITCH + 55: READ K: POKE J,
     K: NEXT :::::: DIM DUMMY(0),
     DUMMY%(0),DUMMY$(0)
132  DATA 32,190,222,32,217,247,1
     65,155,133,131,165,156,133,1
     32,165,129,72,165,130,72,32,
     190,222,32,217,247,104,168,6
     9,130,48,21,104,170,69,129,4
     8,15,152,160,1,145,155,185,1
     29,0,145,131,138,136,16,245,
     96,76,118,221
200  REM
             SWITCH DEMO

210 N = 10: DIM A(N),B(N)
220  FOR J = 1 TO N
230 A(J) =  RND (1):B(J) = A(J)
240  NEXT J
250  REM
          SORT ARRAY A
260  CALL SWITCH,A,DUMMY:: GOSUB
     900: CALL SWITCH,DUMMY,A
270  REM
          SORT ARRAY B
280  CALL SWITCH,B,DUMMY:: GOSUB
     900: CALL SWITCH,DUMMY,B
290  REM
          PRINT ARRAYS
300  FOR J = 1 TO N:: PRINT A(J),
     B(J): NEXT
310  END
900  REM
      EXCHANGE-SORT SUBROUTINE
910  IF N < 2 THEN  RETURN
920  FOR J = 2 TO N
930  FOR K = 1 TO J
940  IF DUMMY(J) < DUMMY(K) THEN
     TEMP = DUMMY(K):: DUMMY(K) =
     DUMMY(J):DUMMY(J) = TEMP
950  NEXT : NEXT : RETURN

]S
```

Blow-by-blow instructions: (1) include lines 130 and 132 of Fig. 2 in your program, and execute them to load SWITCH into memory. SWITCH is relocatable, so you can put it anywhere you have 56 consecutive unused bytes, by assigning an appropriate value to the variable SWITCH in line 130. (2) Write your subroutine(s) to operate on arrays named DUMMY, DUMMY% or DUMMY$. Actually you can use any names, but "DUMMY" reminds you forcibly what the purpose of the variable is. (3) Invocation of a subroutine at line XXXX takes the form:

CALL SWITCH,A,DUMMY: GOSUB XXXX: CALL SWITCH, DUMMY,A to operate on a real array A. To operate on an integer array B%, the CALL becomes CALL SWITCH,B%,DUMMY%; for a string array C$ use CALL SWITCH, C$,DUMMY$. It is essential that the GOSUB XXXX be sandwiched between a pair of SWITCH calls, the second one undoing the swap performed by the first.

Note the dimensioning of DUMMY in line 130. This gives minimal storage overhead. It is not necessary for DUMMY to be multidimensional even when the true working array has two or more dimensions. The arrays in a CALL SWITCH statement must have been previously declared (to prevent an OUT OF DATA error) and must be of the same type (to prevent a TYPE MISMATCH error). If your subroutine has more than one point of return (i.e. if it includes a POP or an ONERR GOTO), be sure that the alternative exits also lead to a CALL SWITCH statement.

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PAGER+

Gary B. Little

I recently picked up the BIG MAC assembler from A.P.P.L.E. and am I glad I did. It certainly outpaces the extremely slow Tool Kit Assembler which I have been using for the last couple of years and it also supports some nice "bonus" features such as the ability to enter upper and lower case comments and the ability to make full use of a 16K RAMcard.

One of the few faults with the BIG MAC assembler is that it does not have built-in commands which allow you to page-format its hardcopy output. That is, you cannot specify your form size and the number of lines that are to be printed on a form before a form feed is to be issued to bring you to the top of the next page of output. The result is a continuous stream of output which proceeds right through the crease in your fan-fold paper. The Tool Kit Assembler features a useful command of the form:

```
PR#1,L54P66
```

which activates a printer in slot #1 and at the same time sets a page length of 54 printed lines and a form length of 66 lines so that after 54 lines are printed, 12 line feeds (12 = 66 - 54) are issued to bring you to the top of the next page of output. (Actually, there is a bug in the Tool Kit Assembler and only 11 line feeds are issued).

I desperately wanted the same capability for BIG MAC. I was obviously not the first person to crave this feature because I soon discovered an apparently undocumented program on the BIG MAC diskette called PAGER which is designed to do basically what I wanted; unfortunately, it can only be used by a printer that supports a form feed.

As you might have guessed, my printer does not support a form feed and so the PAGER routine was totally useless to me. Well, maybe not *totally* useless, as it did provide me with the impetus to write PAGER+, the routine described below, which allows page formatting on *all* printers and which will also allow you to print page headers and page numbers. In addition, an option is available which causes the generation of output to pause at the start of every new page until any key on the Apple keyboard is pressed; this is useful if you are using single-sheet paper.

Obtaining The Pager+ Object Code

The easiest way to obtain the object code for the PAGER+ routine is to first enter the source listing shown below while in the BIG MAC Editor. After this has been done, assemble it and then save both the source and object files under the name PAGER+.

How Pager+ Is Interfaced To Big Mac

PAGER+ is interfaced to BIG MAC via the Editor's USER command. This command does the equivalent of JSR $3F5 instruction when entered. If a JMP $300 instruction has been previously patched in location $3F5, then a routine beginning at $300 can be directly executed by entering the USER command.

The USER command has apparently been included to allow user-defined software printer drivers to be used to control data flow to the printer. Such a driver is commonly used by a user whose printer is not interfaced to the Apple through an interface card plugged into one of its expansion slots but rather through the Game I/O Socket. It is also used by a user who is using an interface card which does not contain controlling firmware (such as the Novation Apple-Cat II modem/serial printer interface).

Notwithstanding the original reason for including the USER command in BIG MAC, there is no reason that it cannot be used for routines such as PAGER+. The only restriction is that the routine starting at $300 cannot be longer than $D0 bytes in length; if it is, then important DOS vectors will be overwritten and BIG MAC will be rendered unusable.

How Pager+ Is Installed

Installation of the PAGER+ routine in the BIG MAC system is a two-step procedure. The first step is to place the main PAGER+ routine at $300. The second step is to interface it to the USER command by patching the locations $3F5-$3F7 so that they contain a JMP to the start of the main PAGER+ routine (which will be at $300).

These two steps are automatically performed by entering the "C" command from BIG MAC Exec Mode and then entering the command:

```
BRUN PAGER+
```

after the catalog has been displayed (this assumes, of course, that PAGER+ is on the diskette being catalogued). When the routine is BRUN, it is BLOADed beginning at location $2F0 and then lines 47 through 53 are executed to set up the JMP $300 at $3F5. Note that although the program is BLOADed at $2F0, the page-formatting routine begins at $300 as desired. The code from $2F0-$2FF resides in the line input buffer and may subsequently be overwritten but since it is not needed again, it doesn't matter.

How Pager+ Is Activated

Once PAGER+ has been installed in the BIG MAC system, it is a simple matter to activate it. Activation is achieved by entering the USER command from the BIG MAC Editor. PAGER+ can later be deactivated by entering a PR#0 command from the Editor. It will automatically be deactivated after a source file has been assembled.

Theory Of Operation

(a) Initialization

As indicated above, the main PAGER+ routine starts at location $300. When the USER command is entered from the Editor, the system will jump to this location and the printer will be turned on and initialized.

Lines 59 and 60 simulate an Applesoft PR#1 command (we will assume that the printer is in slot #1) thus modifying the Apple's output "hooks" at $36/$37 so that they point to the printer interface card. Lines 61–66 then send a control string to the printer. This string can be used to set such things as line width, lines/inch, etc. and can be set to suit your printer by modifying lines 192—195. If this done, then be sure to retain the 0 byte at line 195 as this signals the end of the printer control string.

The next step is to modify the Apple's output hooks at $36/$37 so that the PAGER+ routine will "see" all output destined to be sent to the printer before the printer does. This is done at lines 74–81. Notice what is done: the existing output hooks (which point to the printer interface card) are superimposed on the two bytes following the JMP at line 159 (which is the output point for all characters treated by the PAGER+ routine) and new output hooks are generated which point to the main line counting routine at $351 (line 118) which ultimately generates the form feeds, page pauses and page numbering when necessary.

Lines 86–87 initialize the page number counter to 1. This counter will later be incremented each time that a new page is started.

The last step in the initialization process is to print the first page header and number (if required). This is done in lines 93–111. (The page header and number feature can be disabled by setting the PGNUMBER flag to 0 in line 176). The page header which is printed is found at line 184 and can be modified as required. The only caution is that line 183 and line 185 must be retained: i.e., the page header must be preceded by a carriage return ($8D) and followed by a null ($0). You should note that the page number will be printed immediately after the header, so that you may want to ensure that there is a blank at the end of your header string definition.

(b) After Initialization

After PAGER+ has been initialized, all output destined for the printer will enter the routine at $351 (line 118). If the character is not a carriage return ($8D), a line feed ($8A), or a form feed ($8C), then it will be sent directly to the printer at line 159.

Handling a Carriage Return

If the character received is a carriage return, then the code beginning at line 120 will be executed. The first thing that happens is that the carriage return will be sent to the printer (line 120), then, if the CRSTATUS flag is non-zero, a line feed character is sent to the printer (some printers do not insert their own line feed after a carriage return). The current line count is then incremented (line 126) and compared to PAGESIZE, the parameter which specifies the number of lines which are to be printed per page (line 128); if it matches, then a form feed will be issued. See the section below, entitled Handling a Form Feed, for the details on what happens next.

Handling a Line Feed

If the character received is a line feed, then the code beginning at line 125 will be executed. The line feed will first be sent to the printer (line 125) and then control will proceed from line 126 exactly as if a carriage return had been received.

```
:ASM
                *********************************
2               *                               *
3               *  PAGER+ :  BY Gary Little     *
4               *                               *
5               * Call -A.P.P.L.E. : Oct. 1982  *
6               *                               *
                *********************************
8
                *********************************
10              *                               *
11              * This program is designed to   *
12              * allow paged printer output    *
13              * of BIG MAC assembly listings  *
14              * (or listings obtained by      *
15              * using LIST or PRINT).         *
16              *                               *
                *********************************
18
                *********************************
20              *                               *
21              * INSTRUCTIONS:                 *
22              *                               *
23              * 1. BRUN PAGER+ from BIG MAC.  *
24              * 2. Enter the BIG MAC Editor.  *
25              * 3. Invoke PAGER+ by entering  *
26              *    the USER command.          *
27              * 4. Disable PAGER+ by entering*
28              *    a PR#0 command.            *
29              *                               *
                *********************************
31
32              CSWL    =     $36
33              AMPER   =     $3F5
34              RDKEY   =     $FD0C
35              CROUT   =     $FD8E
36              PRBYTE  =     $FDDA
37              COUT    =     $FDED
38              COUT1   =     $FDF0
39              OUTPORT =     $FE95
40
41                      ORG   $2F0
42
43
                *********************************
45              * Set up AMPERSAND jump         *
                *********************************
```

```
02F0: A9 4C      47            LDA  #$4C        ;Set up 'JMP PAGER'
02F2: 8D F5 03   48            STA  AMPER
02F5: A9 00      49            LDA  #<PAGER
02F7: 8D F6 03   50            STA  AMPER+1
02FA: A9 03      51            LDA  #>PAGER
02FC: 8D F7 03   52            STA  AMPER+2
02FF: 60         53            RTS
                 54
                 55     ********************************
                 56     * Turn on the printer and      *
                 57     * then initialize it.          *
                 58     ********************************
0300: AD AA 03   59     PAGER  LDA  PRSLOT
0303: 20 95 FE   60            JSR  OUTPORT     ;Do a "PR#PRSLOT"
0306: A0 00      61            LDY  #0
0308: B9 C0 03   62     STARTUP LDA  CONTROL,Y  ;Send printer control string
030B: F0 06      63            BEQ  FIXHOOK
030D: 20 ED FD   64            JSR  COUT
0310: C8         65            INY
0311: D0 F5      66            BNE  STARTUP
                 67
                 68     ********************************
                 69     * Set up the output vector     *
                 70     * so that PAGER+ intercepts    *
                 71     * all output before it         *
                 72     * reaches the printer.         *
                 73     ********************************
0313: A5 36      74     FIXHOOK LDA  CSWL
0315: 8D A6 03   75            STA  PRINTIT+1
0318: A5 37      76            LDA  CSWL+1
031A: 8D A7 03   77            STA  PRINTIT+2
031D: A9 51      78            LDA  #<OUTPUT
031F: 85 36      79            STA  CSWL
0321: A9 03      80            LDA  #>OUTPUT
0323: 85 37      81            STA  CSWL+1
                 82
                 83     ********************************
                 84     * Initialize page number to 1. *
                 85     ********************************
0325: A9 01      86            LDA  #1
0327: 8D A8 03   87            STA  PAGENUM
                 88
                 89     ********************************
                 90     * Reset line counter and print *
                 91     * the header and page number.  *
                 92     ********************************
032A: A9 00      93     NEWPAGE LDA  #0
032C: 8D A9 03   94            STA  LINENUM     ;Reset line counter
032F: AD AE 03   95            LDA  PGNUMBER
0332: F0 1A      96            BEQ  NONUM
0334: 8A         97            TXA
0335: 48         98            PHA
0336: A2 00      99            LDX  #0
0338: BD B1 03   100    PRINTHDR LDA  HEADER,X   ;Print page header
033B: F0 06      101           BEQ  PRINTNUM
033D: 20 ED FD   102           JSR  COUT
0340: E8         103           INX
0341: D0 F5      104           BNE  PRINTHDR
                 105
0343: AD A8 03   106    PRINTNUM LDA  PAGENUM
0346: 20 DA FD   107           JSR  PRBYTE      ;Print page number in hex
0349: 68         108           PLA
034A: AA         109           TAX
034B: 20 8E FD   110           JSR  CROUT
034E: 4C 8E FD   111    NONUM  JMP  CROUT
                 112
                 113    ********************************
                 114    * This is the start of the     *
                 115    * routine that counts the      *
                 116    * vertical page movements.     *
                 117    ********************************
0351: C9 8D      118    OUTPUT CMP  #$8D         ;Carriage return received?
0353: D0 48      119           BNE  FFCHECK      ;No, so check for FF
0355: 20 A5 03   120           JSR  PRINTIT
                 121
0358: AD B0 03   122           LDA  CRSTATUS     ;Is a LF required after CR?
035B: F0 05      123           BEQ  UPDATE       ;No, so branch.
035D: A9 8A      124           LDA  #$8A
035F: 20 A5 03   125    LF     JSR  PRINTIT
0362: EE A9 03   126    UPDATE INC  LINENUM      ;Bump line counter
```

```
0365: AD A9 03   127             LDA   LINENUM
0368: CD AB 03   128             CMP   PAGESIZE    ;End of page?
036B: F0 0E      129             BEQ   FORMFEED    ;Yes, so skip to nex t one
036D: 60         130             RTS
                 131
                 132   ********************************
                 133   * Skip to the top of the page. *
                 134   ********************************
036E: AD AF 03   135   SENDLF    LDA   FFAVAIL     ;Are FF's supported?
0371: D0 22      136             BNE   SENDFF      ;Yes, so send one.
0373: A9 8A      137             LDA   #$8A
0375: 20 A5 03   138             JSR   PRINTIT     ;Send a LF
0378: EE A9 03   139             INC   LINENUM
037B: AD A9 03   140   FORMFEED  LDA   LINENUM
037E: CD AC 03   141             CMP   FORMSIZE    ;End of form?
0381: D0 EB      142             BNE   SENDLF      ;No, so dend another LF
0383: EE A8 03   143   CHKPAUSE  INC   PAGENUM
0386: AD AD 03   144             LDA   PAGEWAIT    ;Pause at top of form?
0389: F0 9F      145             BEQ   NEWPAGE     ;No, so keep going.
038B: 98         146             TYA
038C: 48         147             PHA
038D: 20 0C FD   148             JSR   RDKEY       ;Wait for keypress
0390: 68         149             PLA
0391: A8         150             TAY
0392: 4C 2A 03   151             JMP   NEWPAGE
0395: A9 8C      152   SENDFF    LDA   #$8C        ;Send a form feed
0397: 20 A5 03   153             JSR   PRINTIT
039A: 4C 83 03   154             JMP   CHKPAUSE
039D: C9 8C      155   FFCHECK   CMP   #$8C        ;Form feed received?
039F: F0 DA      156             BEQ   FORMFEED
03A1: C9 8A      157             CMP   #$8A        ;Line feed received?
03A3: F0 BA      158             BEQ   LF
03A5: 4C F0 FD   159   PRINTIT   JMP   COUT1       ;Send output to printer
                 160
                 161   ********************************
                 162   * Temporary variables.         *
                 163   ********************************
                 164   PAGENUM   DS    1           ;Current page number
                 165   LINENUM   DS    1           ;Current line number
                 166
                 167   ********************************
                 168   * PAGER+ program parameters.   *
                 169   * Set these to the desired     *
                 170   * values before assembling.    *
                 171   ********************************
03AA: 01         172   PRSLOT    DFB   1           ;Printer slot number
03AB: 36         173   PAGESIZE  DFB   54          ;Number of lines per page
03AC: 42         174   FORMSIZE  DFB   66          ;Number of lines per form
03AD: 01         175   PAGEWAIT  DFB   1           ;0 = No pause at top of form
03AE: 01         176   PGNUMBER  DFB   1           ;0 = No page numbering
03AF: 00         177   FFAVAIL   DFB   0           ;0 = Printer does not support FF
03B0: 00         178   CRSTATUS  DFB   0           ;0 = Printer inserts LF after CR
                 179
                 180   ********************************
                 181   * PAGER+ page header.          *
                 182   ********************************
03B1: 8D         183   HEADER    DFB   $8D
03B2: D0 C1 C7
03B5: C5 D2 AB
03B8: A0 D0 E1
03BB: E7 E5 A0
03BE: A3         184             ASC   "PAGER+ Page #" ;Contents of header
03BF: 00         185             DFB   0
                 186
                 187   ********************************
                 188   * This is the printer control  *
                 189   * string (for Microline 80).   *
                 190   * Change for your own printer  *
                 191   ********************************
03C0: 9E         192   CONTROL   DFB   $9E         ;10 Characters/inch
03C1: 9B B6      193             DFB   $9B,$B6     ;6 Lines/inch
03C3: 9B C1      194             DFB   $9B,$C1     ;80 Characters/line
03C5: 00         195             DFB   0
                 196
                 197   * PAGER+ must end before $3D0
 --End assembly--      214 bytes        Errors: 0
```

Handling a Form Feed

If the character received is a form feed, then the code beginning at line 140 will be executed. Lines 140–141 first check to see if the bottom of the page has already been reached; if it has, then no form feed is necessary and control will go directly to line 143. If not, then the code proceeds to line 135 where the FFAVAIL flag is checked. If FFAVAIL is non-zero, then the printer supports a form feed character and it is sent at line 152; if not, then a line feed is sent to the printer and the line count is incremented. If FFAVAIL is 0 (i.e., the printer does not support a form feed characters) then additional line feeds will be sent to the printer until the line count reaches the size of the form (as specified by the parameter FORMSIZE). The page number will then be incremented (line 143) and the code beginning at line 144 will be executed. This code first checks to see if the PAGEWAIT flag is non-zero; if it is, then the routine will wait for a keyboard keypress before proceeding to the subroutine to print the page header and new page number. If it is not, then the routine will proceed directly to the latter subroutine without pausing.

Pager + Program Parameters

Most of the parameters have been alluded to in the above discussion but will be fully explained here. There are seven program parameters and they can be found in lines 172–178 of the source code. These parameters act as values or flags for the various software and hardware options that are contemplated by PAGER+.

PRSLOT –
this is the printer slot number and can be a number between one and seven.

PAGESIZE –
this is the number of lines which are to be printed on a form before a form feed is to be issued. It must be less than or equal to FORMSIZE.

FORMSIZE –
this is the maximum number of lines which one form can hold. It must be greater than or equal to PAGESIZE.

PAGEWAIT –
this is a flag which controls the behavior of the system at the top of every new page of output. If it is 0, then there will be no pause and printing will continue without interruption; if it is non-zero, then there will be a pause until any key on the keyboard is pressed.

PGNUMBER –
this is a flag which controls whether page numbers and headers will be printed at the top of every page. If it is 0, then they will not be printed; if it is non-zero, then they will be printed.

FFAVAIL –
this is a flag which indicates whether your printer supports a form feed character; i.e., will it skip to the top of the next form when $8C is sent to it. If is is 0, then the printer does not support a form feed; if it is non-zero, then it does.

CRSTATUS –
this is a flag which indicates whether your printer inserts a line feed after every carriage return which it receives. If is is 0, then it does; if it is non-zero, then it doesn't.

WARNING!

You will likely want to modify PAGER+ in order to change the parameters or the page header or the printer control string. If you do so, ensure that the routine does not overlap the areas $3D0–$3FF which contain important DOS vectors used by BIG MAC.

Conclusion

I find that the PAGER+ has been a valuable addition to the BIG MAC assembler. It is flexible enough to be easily configured for use with all printer hardware configurations and for all paper types (fan-fold or single-sheet) and paper sizes. In addition, headers and page numbers can be created which are useful in collating BIG MAC's hardcopy output.

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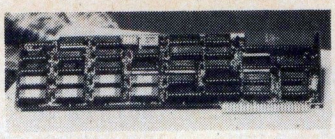

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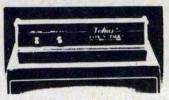

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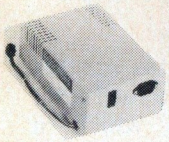

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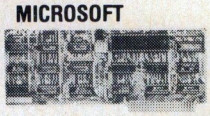

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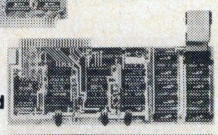

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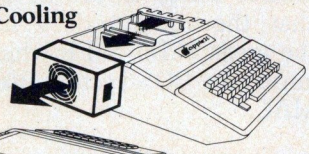

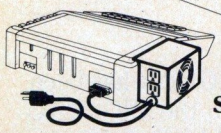

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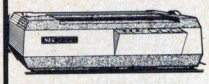

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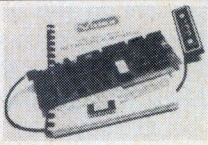

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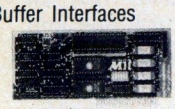

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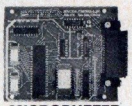

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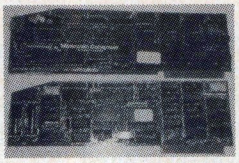

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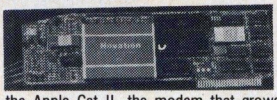

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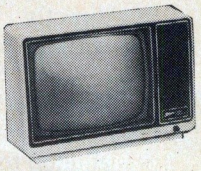

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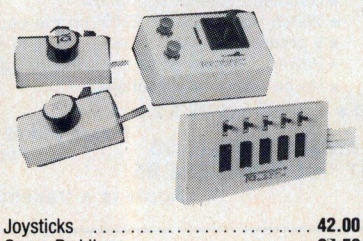

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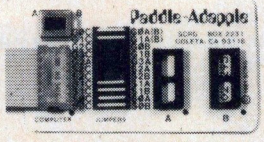

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PRINT USING FINDS A FRIEND?

Craig Peterson

Relocating PUF

THE first approach is rather small and straightforward. Just add three Applesoft program lines at the beginning of your using program, perhaps after you have printed some sort of screen header. The lines are shown in example one. They simply load the Print Using and Friends (PU&F) utility below your current HIMEM (line 10), relocate all the absolute addresses in PU&F (line 20), and then CALL the PU&F utility to set up the &-vector and clear all the variables.

The advantage of this approach is that it will work with any memory size (as long as there is room for PU&F), and with all configurations of DOS, even DOS in a RAM card. Thus it is very flexible and takes maximum advantage of the available memory, especially when using RAM card DOS's like MMS II. The disadvantage is that it requires some Applesoft programming lines which use up about 234 bytes of memory. Also, if you use DATA statements later in the program, you will have to reREAD the ones in line 20 to get past them to your own DATA statements. This is generally a small price to pay for the increased flexibility of the program.

Example 1

```
]LIST

10  PRINT  CHR$ (4)"MAXFILES3":AD
    R =  PEEK (115) + 256 *  PEEK
    (116) - 533: PRINT  CHR$ (4)
    "BLOAD PU&F.O,A";ADR
20  FOR I = 1 TO 11: READ D1,D2:D
    1 = D1 + ADR:D2 = D2 + ADR: POKE
    D1 + 1,D2 / 256: POKE D1,D2 -
    256 *  PEEK (D1 + 1): NEXT :
     DATA  3,16,17,19,26,72,47,7
    2,64,118,68,117,117,130,125,
    382,127,427,129,485,371,150
30  CALL ADR
```

Example 2

```
]LIST

10  TEXT : HOME : VTAB 4: PRINT  SPC(
    13)"PU&F RELOCATER":HMEM =  PEEK
    (115) + 256 *  PEEK (116): POKE
    112, PEEK (116) - 3:D$ =  CHR$
    (4)
20  VTAB 7: INPUT "WHAT IS THE FI
    LENAME FOR PU&F ON  YOUR DI
    SK?  ";N1$
```

The MAXFILES command in line 10 could be whatever you wish. A three is used here because that is the default value for DOS. Most programs could use MAXFILES1 satisfactorily and gain over 1100 bytes of memory as a result. The real function of the MAXFILES comand in statement 10 is to set HIMEM to its maximum value. Without this command, each time the program was re-run, another copy of PU&F would be loaded below the last one, since PU&F drops HIMEM each time it is invoked. The MAXFILES command could be replaced by a HIMEM command which sets HIMEM directly, but this would make the program less flexible and unnecesarily restrict the memory/DOS configurations under which it could be run. The filename PU&F.0 should be whatever you've named the PU&F utility on your own disk.

The second approach is shown in example two. This is an Applesoft program which will configure PU&F for the specific memory/DOS size under which it will run. As such, it will always load in the same area of memory, which is determined by conditions existing at the time of its creation. So first set up your DOS and any other factors which would affect HIMEM. Then load and run PUF RELOCATER, and you can create a special version of PU&F to run under exactly those conditions.

```
30  VTAB 10: INPUT "PLACE DISK IN
     DRIVE AND PRESS RETURN..";A
    $:ADR = HMEM - 533: PRINT D$
    "BLOAD";N1$;",A";ADR
40  REM
50  REM REVISE ABSOLUTE ADDRESSES

60  FOR I = 1 TO 11: READ D1,D2:D
    1 = D1 + ADR:D2 = D2 + ADR: POKE
    D1 + 1,D2 / 256: POKE D1,D2 -
    256 *  PEEK (D1 + 1): NEXT :
     DATA  3,16,17,19,26,72,47,7
    2,64,118,68,117,117,130,125,
    382,127,427,129,485,371,150
70  REM
80  REM  RAM CARD DOS CHANGES
90  REM
100  IF  PEEK (978) < 158 GOTO 16
    0
110  VTAB 12: CALL  - 868: INPUT
    "FIRMWARE CARD SLOT (0-7)?";
    A$:S =  VAL (A$): IF S < 0 OR
    S > 7 THEN  PRINT  CHR$ (7):
     GOTO 110
```

To invoke it from a user program, simply BRUN it at the beginning of the program.

This approach has the advantage of taking fewer bytes of the user program to invoke it, and has the disadvantage that it will only run in the memory location in which it was configured. If you configure it to run with a RAM card DOS, and then try to run it under normal 48K Apple DOS, it will load right on top of DOS. If the program is always run under the same conditions, this will not be a problem. Incidentally, if you do configure it while under a RAM card DOS, you will be asked what slot your firmware card is in. If your Applesoft is in ROM on the motherboard, just press RETURN.

Both approaches should be capable of running PU&F under any and all memory/DOS configurations. They have both been tested on 32K Apple DOS, 48K Apple DOS, Cornelis Bonger's DOS MOVER, William Reynolds III's MMS II, and Michael McLaren's MEMORY MASTER 1.0 and 2.0. Hopefully they will solve any problems you may have in using PU&F with other than 48K Apple DOS.

Print Using and Friends was published in Call—A.P.P.L.E. in Depth Issue 1, "All About Applesoft".

```
120 ADR = ADR - 24: FOR I = ADR TO
    ADR + 23: READ B: POKE I,B: NEXT
    : POKE ADR + 11,128 + S * 16
    : DATA 141,129,192,173,0,224
    ,201,76,240,3,141,128,192,10
    4,201,124,208,251,104,162,0,
    142,0,2
130  PRINT
140  REM  SAVE IT TO DISK
150  REM
160  PRINT : INPUT "WHAT FILENAME
     DO YOU WISH TO USE FOR  T
    HIS VERSION OF PU&F?  ";N2$:
     PRINT : INPUT "INSERT DISK
    AND PRESS RETURN..";A$: PRINT
    D$;"BSAVE";N2$;",A";ADR;",L"
    ;HMEM - ADR
170  PRINT : PRINT "ALL DONE!"
```

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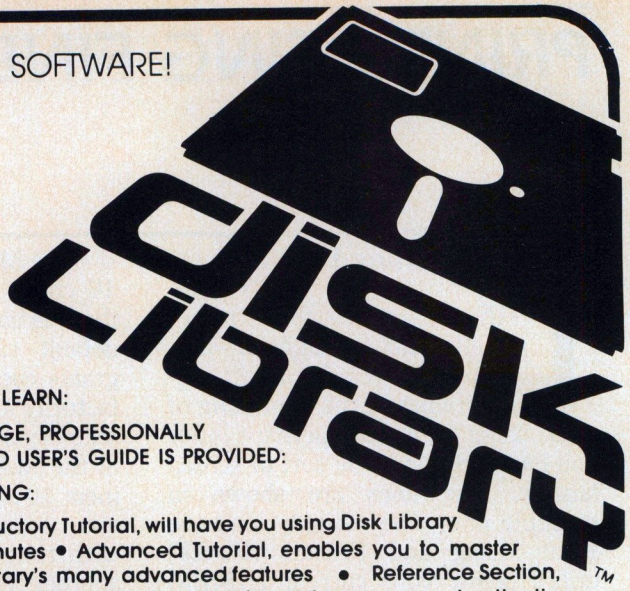

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IF/THEN/ELSE

Cornelis Bongers/Call —A.P.P.L.E. Staff Writer

IN almost every program it occurs that, depending on the value of a variable expression, or different sets of statements have to be executed. A control statement that can be of great use to accomplish this is the IF/THEN/ELSE statement. The IF/THEN/ELSE statement is not implemented in Applesoft, but fortunately it is an easy matter to link a machine language IF/THEN/ELSE handler via the & hook to Applesoft. The IF/THEN/ELSE handler is listed in figure 1 and can be installed with the BRUN command. For details about the use of the & symbol and linking routines to Applesoft, I refer to my previous article "Execute Strings" *Call -A.P.P.L.E.* September 1982.

A simple example of the IF/THEN/ELSE statement is displayed in figure 2. In response to the question "Are you sure," the user has to enter either "Y" or "N." If the letter "Y" is entered the subroutine at line 200 is executed, whereas if the input is any other key control passes to the subroutine at line 300. Figure 2 also illustrates the syntax of the IF/THEN/ELSE statement. In more formal terms, the syntactic definition is as follows:

& IF expression THEN compound statement/line no
[:& ELSE compound statement/]

or

& IF expression GOTO line no
[:& ELSE compound statement]

The compound statement itself may also contain the IF/THEN/ELSE statement. The following are the rules of evaluation:

1. If the expression following the & IF is true, the line will be executed from the keyword following the expression to the matching & ELSE (if present).
2. If the expression is not true, the routine searches for the ELSE keyword that matches the & IF. For this purpose a counter is initialized to zero and the search starts directly behind the expression. If an & IF is encountered, the counter is incremented by one. If an & ELSE is found, the counter is decremented by one. The matching ELSE is found as soon as the counter becomes negative and execution is restarted after the ELSE.
3) If an & IF is not followed by a matching & ELSE, the & IF works identical to the normal IF instruction.
4. If an & ELSE is not preceded by a matching & IF, the & ELSE has the same effect as a REM instruction.

Multiple IF's and ELSE's can be used to add an input check to the program of figure 2. The result is listed in figure 3. The handling of the users

—●→

Figure 2

```
]LIST

10  REM
*****YES/NO QUESTION
      WITH
IF/THEN/ELSE I

100   PRINT "ARE YOU
      SURE (Y/N) ? ";:
      GET A$
105   PRINT A$: IF  ASC
      (A$) = 3 THEN
       STOP
110   &  IF A$ = "Y"
      THEN  GOSUB 200:
      & ELSE GOSUB 300
120   REM ***** OTHER
      STATEMENTS
130   GOTO 100
200   PRINT "IT WAS YES":
      RETURN
300   PRINT "IT WAS NO":
      RETURN

]RUN
ARE YOU SURE (Y/N) ?
      Y
IT WAS YES
ARE YOU SURE (Y/N) ?
      N
IT WAS NO
ARE YOU SURE (Y/N) ?
      H
IT WAS NO
```

Figure 1

```
      **********************************
2     *                                *
3     *  IF/THEN/ELSE for Applesoft    *
4     *                                *
5     *      by Cornelis Bongers       *
6     *                                *
7     * Call -A.P.P.L.E. : Oct. 1982   *
8     *                                *
      **********************************
10    *
11              ORG   $8D00
12    *
13    * zero page addresses
14    *
15    SSTS      =     $6F          ;top of string pool
16    HIM       =     $73          ;HIMEM
17    CHNW      =     $B1          ;CHARGET
18    CHOL      =     $B7          ;CHARGOT
19    EXP       =     $9D          ;exponent mfp
20    COUNT     =     $FE          ;IF counter
21    YSAVE     =     $FF          ;temp storage y-register
22    *
23    * & vector,constants
24    *
25    BJP       =     $3F5         ;& vector
26    IF        =     173          ;IF token
27    THEN      =     196          ;THEN token
28    GOTO      =     171          ;GOTO token
29    AMP       =     175          ;& token
30    *
31    * Applesoft routines
32    *
33    CHCK      =     $DEC0        ;check char in accu
34    LPIF      =     $D9E1        ;start execution
35    SYNT      =     $DEC9        ;syntax error
36    EEXP      =     $DD7B        ;evaluate expression
37    REMARK    =     $D9DC        ;REM handler
```

IF/THEN/ELSE

```
                        38  ADDON    =    $D998       ;update TXTPTR (Stowe Keller)
                        39  *
                        40  * initialization
                        41  *
8D00: A9 00             42  BEGIN    LDA  #<BEGIN
8D02: 85 73             43           STA  HIM         ;set HIMEM
8D04: 85 6F             44           STA  SSTS        ;set top of stringpool
8D06: A9 8D             45           LDA  #>BEGIN
8D08: 85 74             46           STA  HIM+1
8D0A: 85 70             47           STA  SSTS+1
8D0C: A9 17             48           LDA  #START
8D0E: 8D F6 03          49           STA  BJP+1       ;set & vector
8D11: A9 8D             50           LDA  #>START
8D13: 8D F7 03          51           STA  BJP+2
8D16: 60                52           RTS
                        53  *
                        54  * main program
                        55  *
8D17: C9 AD             56  START    CMP  #IF         ;if token ?
8D19: F0 0B             57           BEQ  ITSIF       ;branch if so
8D1B: 20 60 8D          58           JSR  CKEL        ;ELSE ?
8D1E: 90 03             59           BCC  ITSEL       ;branch if so
8D20: 4C C9 DE          60           JMP  SYNT        ;syntax error if not
8D23: 4C DC D9          61  ITSEL    JMP  REMARK      ;skip to end of line
8D26: 20 B1 00          62  ITSIF    JSR  CHNW        ;advance textpointer
8D29: 20 7B DD          63           JSR  EEXP        ;evaluate expression
8D2C: 20 B7 00          64           JSR  CHOL        ;get byte after expression
8D2F: C9 AB             65           CMP  #GOTO       ;GOTO token ?
8D31: F0 05             66           BEQ  YGOTO       ;branch if so
8D33: A9 C4             67           LDA  #THEN       ;check on THEN token
8D35: 20 C0 DE          68           JSR  CHCK        ;syntax error if not present
8D38: A5 9D             69  YGOTO    LDA  EXP         ;was expression 'true'
8D3A: D0 21             70           BNE  GO          ;execute next stmnts if so
8D3C: 85 FE             71           STA  COUNT       ;ELSE search matching ELSE
8D3E: A8                72           TAY
8D3F: B1 B8             73  SF       LDA  (CHOL+1),Y  ;get byte
8D41: F0 E0             74           BEQ  ITSEL       ;branch if end of line
8D43: C8                75  SF1      INY
8D44: C9 AF             76           CMP  #AMP        ;& token ?
8D46: D0 F7             77           BNE  SF          ;branch if not
8D48: B1 B8             78           LDA  (CHOL+1),Y  ;get next byte
8D4A: F0 D7             79           BEQ  ITSEL
8D4C: C9 AD             80           CMP  #IF         ;IF ?
8D4E: D0 04             81           BNE  MAYEL       ;branch if not
8D50: E6 FE             82           INC  COUNT       ;increment if counter
8D52: D0 EF             83           BNE  SF1         ;always
8D54: 20 62 8D          84  MAYEL    JSR  CKEL1       ;ELSE ?
8D57: B0 EA             85           BCS  SF1         ;branch if not
8D59: C6 FE             86           DEC  COUNT       ;decrement if counter
8D5B: 10 E2             87           BPL  SF          ;branch if no balance
8D5D: 4C E1 D9          88  GO       JMP  LPIF        ;ready, execute
                        89  *
                        90  * CKEL: check on ELSE
                        91  *
8D60: A0 00             92  CKEL     LDY  #$00        ;main entry
8D62: 84 FF             93  CKEL1    STY  YSAVE       ;save pointer to current byte
8D64: A2 04             94           LDX  #$04
8D66: DD 7D 8D          95  ELS      CMP  ELSE-1,X    ;compare
8D69: D0 0D             96           BNE  NOELSE
8D6B: C8                97           INY
8D6C: B1 B8             98           LDA  (CHOL+1),Y  ;get next byte
8D6E: CA                99           DEX
8D6F: D0 F5            100           BNE  ELS
8D71: 20 98 D9         101           JSR  ADDON       ;update textpointer
8D74: A0 00            102           LDY  #$00        ;update Y register
8D76: 18               103           CLC              ;flag ELSE found
8D77: 60               104           RTS
8D78: A4 FF            105  NOELSE   LDY  YSAVE       ;restore Y
8D7A: B1 B8            106           LDA  (CHOL+1),Y  ;and accu
8D7C: 38               107           SEC              ;flag ELSE not found
8D7D: 60               108           RTS
                       109  *                                  --End assembly--
                       110  * ELSE
                       111  *                                  130 bytes
8D7E: 45 53 4C
8D81: 45               112  ELSE     ASC  'ESLE'               Errors: 0
```

response is definitely more efficient than in lines 110–117 of the program listed in figure 4, which shows the construction forced upon us by Applesoft. As can be seen, due to Applesoft's lack of suitable control structures, two extra GOTO instructions are necessary to implement the check.

Most advocates of Pascal and other *structured* languages state that applications of the GOTO instructions results in programs that are hard to read (by human beings) and that, therefore, the GOTO statement should be removed from programming languages. I think this is stressed too far, but there is no point in denying that generally IF/THEN/ELSE (and similar) statements are to be preferred above the GOTO statement. Unfortunately, for Applesoft users this is only true as long as the & IF/THEN/ELSE statement is not too complex, as IF/THEN/ELSE contruction is not supported by *pretty print* programs, thus a long line containing many IF/THEN/ELSE pairs will be about as hard to read as a program segment containing many GOTO's. The small example, which will be discussed next, is therefore only meant for illustration purposes and not as a recommendation to use IF/THEN/ELSE in complex situations.

Suppose the median (i.e. the middle value) of three distinct values, stored in the variables A, B, and C, has to be determined. Assuming the median has to be assigned to the variable D, we may use the *standard* Applesoft program listed in figure 5. By making use of IF/THEN/ELSE, lines 30-90 of this program can be reduced to one line, as is shown by the program listed in figure 6. (Try to understand how it works before reading on.)

Figure 3

```
]LIST
10  REM
***** YES/NO QUESTION
      WITH
IF/THEN/ELSE II

100   PRINT "ARE YOU
      SURE (Y/N) ? ";:
      GET A$
105   PRINT A$: IF  ASC
      (A$) = 3 THEN
       STOP
110   &  IF A$ = "Y"
      THEN  GOSUB 200:
      & ELSE &  IF A$
      = "N" THEN  GOSUB
      300: & ELSE GOSUB
      400: GOTO 100
120   REM ***** OTHER
      STATEMENTS
130   GOTO 100
200   PRINT "IT WAS YES":
      RETURN
300   PRINT "IT WAS NO":
      RETURN
400   PRINT "INCORRECT
      ANSWER": RETURN

]RUN
ARE YOU SURE (Y/N) ?
      Y
IT WAS YES
ARE YOU SURE (Y/N) ?
      N
IT WAS NO
ARE YOU SURE (Y/N) ?
      H
INCORRECT ANSWER
```

Figure 4

```
]LIST
10  REM
***** YES/NO QUESTION
STANDARD APPLESOFT

100   PRINT "ARE YOU
      SURE (Y/N) ? ";:
      GET A$
105   PRINT A$: IF  ASC
      (A$) = 3 THEN
       STOP
110   IF A$ = "Y" THEN
       GOSUB 200: GOTO
       120
115   IF A$ = "N" THEN
       GOSUB 300: GOTO
       120
117   GOSUB 400: GOTO
       100
120   REM ***** OTHER
       STATEMENTS
130   GOTO 100
200   PRINT "IT WAS YES":
       RETURN
300   PRINT "IT WAS NO":
       RETURN
400   PRINT "INCORRECT
       ANSWER": RETURN
```

Figure 5

```
]LIST
10  REM
***** DETERMINE MEDIAN
      OF A,B
AND C - STANDARD APPLESOFT
20  INPUT A,B,C
30  IF A > B GOTO 70
40  IF B < C THEN  LET
      D = B: GOTO 100
50  IF A < C THEN  LET
      D = C: GOTO 100
60  GOTO 90
70  IF B > C THEN  LET
      D = B: GOTO 100
80  IF A > C THEN  LET
      D = C: GOTO 100
90  LET D = A
100  PRINT "THE MEDIAN
      IS ";D
110  GOTO 20
]RUN
?1,5,7
THE MEDIAN IS 5
?1,7,5
THE MEDIAN IS 5
?5,1,7
THE MEDIAN IS 5
?5,7,1
THE MEDIAN IS 5
?7,1,5
THE MEDIAN IS 5
?7,5,1
THE MEDIAN IS 5
```

Figure 6

```
]LIST
10  REM
***** DETERMINE MEDIAN OF
A,B AND C WITH IF/THEN/ELSE
      I
20  INPUT A,B,C
30  &  IF A > B THEN
       &  IF B > C THEN
       LET D = B: &
      ELSE &  IF A >
      C THEN  LET D
      = C: & ELSE LET
      D = A: & ELSE
      &  IF B < C THEN
       LET D = B: &
      ELSE &  IF A <
      C THEN  LET D
      = C: & ELSE LET
      D = A
40  PRINT "THE MEDIAN
      IS ";D
50  GOTO 20
```

Figure 7

```
]LIST
10  REM
***** DETERMINE MEDIAN OF
A,B AND C WITH IF/THEN/ELSE
      II

20  INPUT A,B,C
30  LET D = A: &  IF
      A > B THEN  &
       IF B > C THEN
       LET D = B: &
      ELSE &  IF A >
      C THEN  LET D
      = C: & ELSE: &
      ELSE &  IF B <
      C THEN  LET D
      = B: & ELSE &
       IF A < C THEN
       LET D = C
40  PRINT "THE MEDIAN
      IS ";D
50  GOTO 20
```

Closer examination of the line reveals that each of the three different assignment occurs twice. So, the line may be shortened somewhat by placing, for instance, the assignment D=A at the start of the line. Now the two D=A assignments can be removed from the conditional part of the line (see figure 7). Note that the & ELSE that was placed before the first D=A

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assignment must be kept in position, for otherwise the IF's and ELSE's would be unbalanced. In the situation that both A>B and B>C are true but A>C is not true, no assignment will take place because the & ELSE after the A>C comparison is immediately followed by a second & ELSE (which is treated as a REM statement). This is correct for the median equals in this case A, and A is assigned to D already.

The statement can be simplified further by making use of the fact that it is allowed to mix the & IF instruction and the normal IF instruction (see figure 8). Since the A>C comparison is handled by Applesoft's IF handler, the rest of the line will be skipped if A<C. So the effect of using the Applesoft IF is identical to the & ELSE: & ELSE construction of figure 7.

I hope these examples have sufficiently demonstrated the power and the advantages of the IF/THEN/ELSE statement. Especially when only one & IF/ELSE pair is necessary to evaluate the different alternatives, the IF/THEN ELSE statement is very useful. By the way, if more than, say two IF/THEN/ELSE pairs are required, there is often a more efficient solution as is shown by line 30 of the program listed in figure 9.

Acknowledgement: My thanks to Hans Geilenkirchen for proofreading and criticizing the first draft of this note.

Figure 8

```
]LIST
10   REM
***** DETERMINE MEDIAN OF
A,B AND C WITH IF/THEN/ELSE
       III
20   INPUT A,B,C
30   LET D = A: &  IF
       A > B THEN  &
        IF B > C THEN
        LET D = B: &
       ELSE IF A > C
       THEN  LET D =
       C: & ELSE &  IF
       B < C THEN  LET
       D = B: & ELSE
       IF A < C THEN
        LET D = C
40   PRINT "THE MEDIAN
       IS ";D
50   GOTO 20
```

Figure 9

```
]LIST
10   REM
***** DETERMINE MEDIAN
       OF A,B
AND C WITH RELATIONAL
       OPERATORS
20   INPUT A,B,C
30   LET D = A: &  IF
       (B < C) - (A >
       B) THEN  LET D
       = B: & ELSE &
        IF (C < A) -
       (A < B) THEN
       LET D = C
40   PRINT "THE MEDIAN
       IS ";D
50   GOTO 20

]RUN
?1,5,7
THE MEDIAN IS 5
?1,7,5
THE MEDIAN IS 5
?5,1,7
THE MEDIAN IS 5
?5,7,1
THE MEDIAN IS 5
?7,1,5
THE MEDIAN IS 5
?7,5,1
THE MEDIAN IS 5
```

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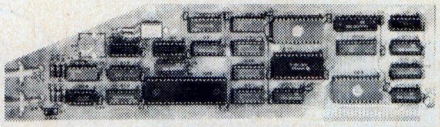

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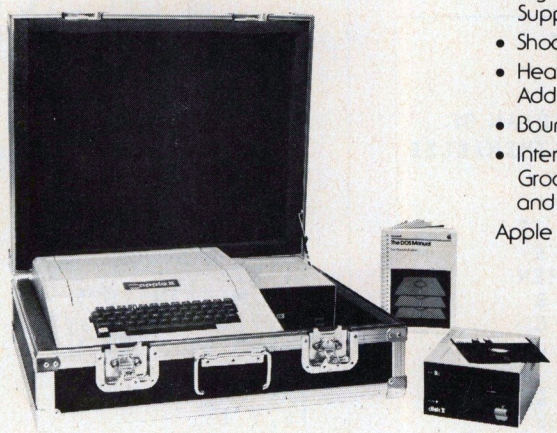

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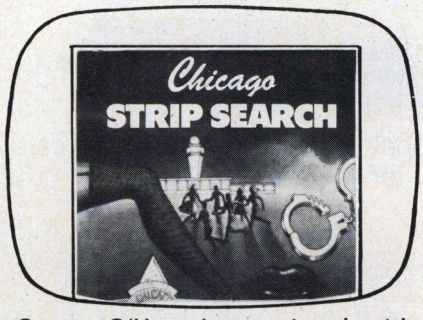

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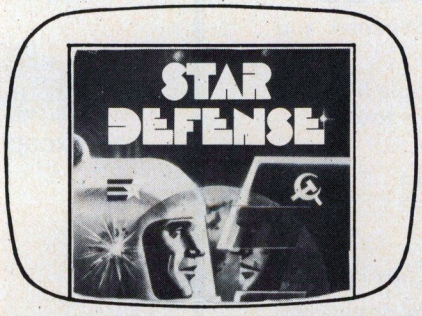

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FIND IT

Anthony Rose

WHEN patching software or searching for something in memory, and after having typed "L" for the 10,000,000th (binary) time, you begin to get the idea that perhaps it would be better if the computer did the searching for you. So you rush off and type

```
10  FOR I = 800 TO 50000
20  IF PEEK(I) = XX AND PEEK
    (I+1) = YY THEN PRINT I
30  NEXT
```

and, after substituting the correct values you RUN it. About ten minutes later, with decimal numbers still scrolling off the top of the screen, the program terminates.

Now to do some decimal to hex conversions... Having decided that this approach is possibly not the best, you think that perhaps a machine-code routine would help. Program FIND presented here will search 32K for a two-byte hex string in about 1.5 seconds. The addresses of the locations holding the bytes are printed in hex. The program is originated at $2D0 to keep it out of the way of the DOS vectors, which will reduce the keyboard input buffer to 208 (decimal) characters. If this is not desired, the program can be originated elsewhere.

BRUN the program to initiate it, then enter [Ctrl-F] each time you wish to search. You will then be prompted for the hex string to be searched for, which should be entered as four hex digits without spaces in between, as should the starting address and end address. Setting PR#1 beforehand will send output to the printer, so that the precious addresses may be kept for posterity.

```
ASM                    ********************************
                       *                              *
                       *  Finding a 2-byte Hex String *
                       *                              *
                       *     by  Anthony Rose         *
                       *                              *
                       * Call -A.P.P.L.E. : Oct. 1982 *
                       *                              *
                       ********************************
                       *
                       CH        =     $24
                       MODE      =     $31
                       PROMPT    =     $33
                       KSWL      =     $38
                       A2L       =     $3E
                       GETLNZ    =     $FD67
                       GETLN     =     $FD6A
                       COUT      =     $FDED
                       GETNUM    =     $FFA7
                       *
                                 ORG   $2D0
                       *
02D0:  A9 DB                     LDA   #<BEGIN   ;set input
02D2:  85 38                     STA   KSWL      ;vectors to
02D4:  A9 02                     LDA   #>BEGIN   ;"BEGIN"
02D6:  85 39                     STA   KSWL+1
02D8:  4C EA 03                  JMP   $3EA
                       *
02DB:  20 1B FD        BEGIN     JSR   $FD1B     ;Get character
02DE:  C9 86                     CMP   #$86      ;Ctrl-F?
02E0:  F0 01                     BEQ   FIND
02E2:  60                        RTS
                       *
02E3:  A5 33           FIND      LDA   PROMPT    ;Save prompt
02E5:  48                        PHA
02E6:  A9 A0                     LDA   #$A0      ;New prompt
02E8:  85 33                     STA   PROMPT    ;Char = space
02EA:  C6 24                     DEC   CH        ;Dec cursor
02EC:  A2 00                     LDX   #$00
02EE:  BD 86 03        PRINT     LDA   TABLE,X   ;Print table
02F1:  20 ED FD                  JSR   COUT
02F4:  E8                        INX
02F5:  E0 1D                     CPX   #29
02F7:  D0 F5                     BNE   PRINT
02F9:  20 6A FD                  JSR   GETLN
02FC:  A9 FF                     LDA   #$FF
02FE:  85 31                     STA   MODE      ;Set "MODE"
0300:  A0 00                     LDY   #$00
0302:  20 A7 FF                  JSR   GETNUM
0305:  A5 3E                     LDA   A2L       ;Move to safe
0307:  85 FE                     STA   $FE       ;area
0309:  A5 3F                     LDA   A2L+1
030B:  85 FF                     STA   $FF
                       *
030D:  A2 00                     LDX   #00       ;2nd message
030F:  BD A3 03        PRINT1    LDA   TABLE1,X
0312:  20 ED FD                  JSR   COUT
0315:  E8                        INX
0316:  E0 14                     CPX   #20
0318:  D0 F5                     BNE   PRINT1
031A:  20 6A FD                  JSR   GETLN
031D:  A0 00                     LDY   #$00
031F:  20 A7 FF                  JSR   GETNUM
0322:  A5 3E                     LDA   A2L
0324:  85 FC                     STA   $FC
0326:  A5 3F                     LDA   A2L+1
0328:  85 FD                     STA   $FD
                       *
032A:  A2 00                     LDX   #$00      ;3rd message
032C:  BD B7 03        PRINT2    LDA   TABLE2,X
```

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```
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0332:  E8         72              INX
0333:  E0 12      73              CPX   #18
0335:  D0 F5      74              BNE   PRINT2
0337:  20 6A FD   75              JSR   GETLN
033A:  A0 00      76              LDY   #$00
033C:  20 A7 FF   77              JSR   GETNUM
                  78  *
                  79  * FE=STRING FC=START 3E=END
                  80  *  Search for string now
                  81  *
033F:  A9 8D      82              LDA   #$8D
0341:  20 ED FD   83              JSR   COUT
0344:  A0 00      84              LDY   #$00
0346:  B1 FC      85  SEARCH      LDA   ($FC),Y
0348:  C5 FF      86              CMP   $FF         ;Found byte?
034A:  F0 20      87              BEQ   FOUND
034C:  E6 FC      88  NEXT        INC   $FC         ;Inc address
034E:  A5 FC      89              LDA   $FC         ;for next byte
0350:  C5 3E      90              CMP   A2L
0352:  D0 0F      91              BNE   NEXT1
0354:  A5 FD      92              LDA   $FD
0356:  18         93              CLC
0357:  69 01      94              ADC   #$01
0359:  C5 3F      95              CMP   A2L+1
035B:  90 06      96              BCC   NEXT1
035D:  68         97              PLA               ;Old prompt
035E:  85 33      98              STA   PROMPT
0360:  4C 67 FD   99              JMP   GETLNZ      ;Cancel line
0363:  A5 FC      100 NEXT1       LDA   $FC
0365:  D0 DF      101             BNE   SEARCH
0367:  E6 FD      102             INC   $FD
0369:  4C 46 03   103             JMP   SEARCH
036C:  C8         104 FOUND       INY
036D:  B1 FC      105             LDA   ($FC),Y
036F:  88         106             DEY
0370:  C5 FE      107             CMP   $FE
0372:  D0 D8      108             BNE   NEXT
                  109 *
0374:  A9 A0      110             LDA   #$A0        ;Print space
0376:  20 ED FD   111             JSR   COUT
0379:  A5 FD      112             LDA   $FD
037B:  20 DA FD   113             JSR   $FDDA       ;Print as hex
037E:  A5 FC      114             LDA   $FC
0380:  20 DA FD   115             JSR   $FDDA
0383:  4C 4C 03   116             JMP   NEXT
0386:  C5 CE D4
0389:  C5 D2 A0
038C:  D4 D7 CF
038F:  A0 C2 D9
0392:  D4 C5 A0
0395:  D3 C5 C1
0398:  D2 C3 C8
039B:  A0 D3 D4
039E:  D2 C9 CE
03A1:  C7 BA      117 TABLE   ASC "ENTER TWO BYTE SEARCH STRING:"
03A3:  C5 CE D4
03A6:  C5 D2 A0
03A9:  D3 D4 C1
03AC:  D2 D4 A0
03AF:  C1 C4 C4
03B2:  D2 C5 D3
03B5:  D3 BA      118 TABLE1  ASC "ENTER START ADDRESS:"
03B7:  C5 CE D4
03BA:  C5 D2 A0
03BD:  C5 CE C4
03C0:  A0 C1 C4
03C3:  C4 D2 C5
03C6:  D3 D3 BA   119 TABLE2  ASC "ENTER END ADDRESS:"

--End assembly--

249 bytes

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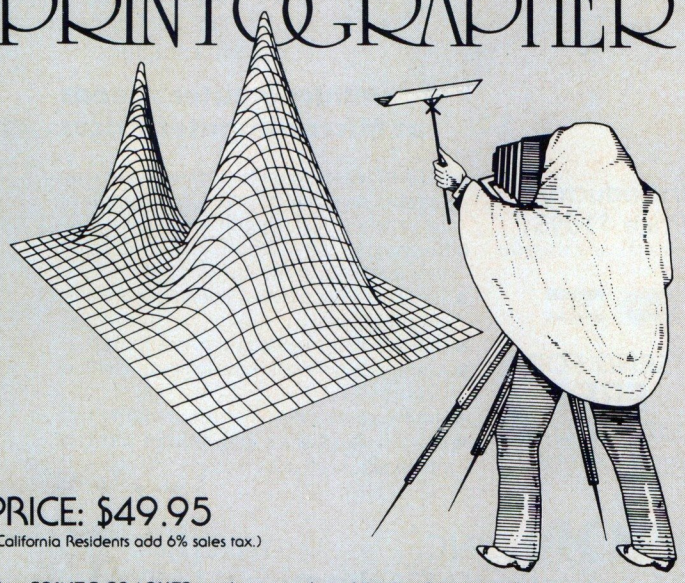

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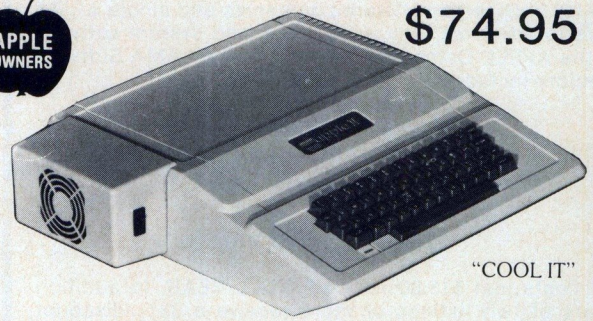

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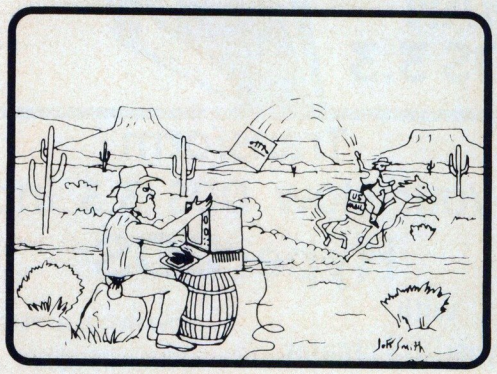

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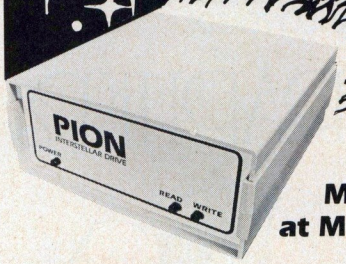

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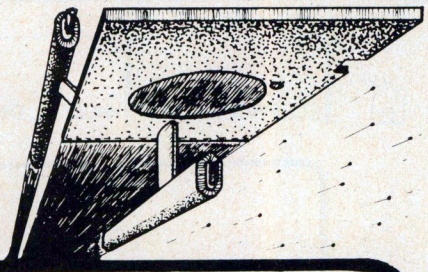

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A **Call —A.P.P.L.E.** MINI-UTILITY:

RETURNING YOUR REMARKS

David G. Sparks

THERE you are, proud as punch. You have just fixed the last bug in your latest program and it works exactly as you intended. What's even better, your local users' group got wind of your project and wants a fully documented copy for its next meeting. You set out to write your instructions into the program text as REM statements.

One of the "charms" of the Apple][is that it lists programs in a 33-column format. It always seems that my REM statements come apart when listing them to the screen, like this:

```
100 REM IT CAN BE MIGHTY FRUSTRA
      TING TO HAVE YOUR INSTRUCT
      IONS ALL BUSTED UP.  IT DO
      ESN'T LOOK PROFESSIONAL, A
      T THE VERY LEAST.
```

I often wondered at the much nicer-looking listings in *Call -A.P.P.L.E.,* such as:

```
100  REM

MUCH MORE ATTRACTIVE
LISTINGS SEEMINGLY PRO-
DUCED BY EVERYBODY ELSE
BUT ME.

HOW DO THEY DO IT?
```

One day, I called on the hot line to find out. Val knew of two ways. This magazine has published several programs to produce very nice listings to the printer. The reader is referred to *PEEKing at Call -A.P.P.L.E.* -1980 for these. When preparing programs for publication, Val says he uses Program Line Editor (PLE) to insert carriage returns into REM statements.

Not one to re-invent the wheel, I gave that a try. PLE is a widely-admired utility for programming either BASIC on the Apple][. In the edit mode, you move the cursor to the point where you want the listing to begin a new line, and enter control-O, control-M. You will see the M when in edit mode of PLE, but you will get the desired result when you LIST the line so modified.

The PLE approach has one or two drawbacks. I will discuss the problems of the PLE approach, then present a short utility which will work with any Apple][, using either BASIC, independent of any other programming utility you may or may not possess.

PLE's edit mode uses the full width of the text window, instead of the abbreviated format of the LIST command. This will give you a 40-column line unless you change the text window. For instance, POKE 33,33 will make PLE issue 33-column editing lines. You will find that to be more useful when editing REM statements. The TEXT command will restore the window to 40-columns, as will hitting the RESET key.

BASIC inserts a space after REM. If you enter a line 100 REM-EXAMPLE (no space after REM), it will LIST as 100 REM EXAMPLE (one space inserted). If you enter a line 100 REM ONE SPACE HERE (you typed one space after REM), BASIC still insists on spacing after REM. Your line will list as 100 REM ONE SPACE HERE (only there are actually two spaces, yours plus BASIC's.)

PLE also inserts a space after REM, no matter what. If you fail to delete that space, it becomes part of the edited program line. Edit a line several times, and those spaces pile up. You can easily delete them, but it is a nuisance, and you have to remember to do it.

The final drawback is simply that you would rather be able to type the carriage returns into the REM as you enter it the first time.

Attached is a brief utility that allows a more natural entry of REM statements. It is short enough to enter directly, if you do not have an assembler. Go into the monitor with CALL -151. Type the addresses and their associated hex numbers. Some lines do not have addresses; ignore them. Separate each address from its associated hex numbers by a colon. Terminate each line with a carriage return.

```
:ASM
                    ********************************
                    *                              *
                    * REM Changer  by David Sparks *
                    *                              *
                    * Call -A.P.P.L.E. : Oct. 1982 *
                    *                              *
                    ********************************
                    *
                    INTSTRT  =    $CA
                    INTEND   =    $4C
                    INTTOKEN =    $C0
                    INTCR    =    $8D
                    FPSTRT   =    $67
                    FPEND    =    $AF
                    FPTOKEN  =    $40
                    FPCR     =    $0D
                    PROGSTRT =    $6
                    PROGLEN  =    $8
                    TKNSTOR  =    $1A
                    CRSTOR   =    $1B
                    *
                              ORG  $300
                    *
                    * SET UP AMPERSAND POINTER
                    *
0300: A9 4C                   LDA  #$4C
0302: 8D F5 03                STA  $3F5
0305: A9 0F                   LDA  #BEGIN
0307: 8D F6 03                STA  $3F6
030A: A9 03                   LDA  #>BEGIN
```

RETURNING YOUR REMARKS

When you have typed all the addresses and their associated hex numbers, check your work. Type 300L<return> and look at the screen. You should see the addresses, the hex numbers, and at the right the "disassembled" instructions those numbers represent. You will find similar instructions in the listing from which you copied the numbers. Compare the listing on the page with the one on your screen. When you reach the bottom of the screen, type L<return> to get another screenful of *disassembled* code.

Fix any errors you see. Then BSAVE REM CHANGE, A$300, L$6F.

When entering REMs, simply insert "@" (SHIFT-P) wherever you want a carriage return. BRUN REM CHANGER and it will automatically determine which language is in use, and turn SHIFT-P's into carriage returns. If you are programming in Applesoft, you may (after once BRUNning it), call the utility by simply typing the ampersand, "&" <return>.

POKE 33,33 to make things easier. Then a line entered thusly:

```
100 REM@@THIS IS A TEST OF
    THE RE M@CHANGER PRO-
    GRAM AT WORK. NOTE@
    THAT AS LONG AS YOU DO
    NOT GO@PAST THE "@"
    CHARACTER IN THE@LINE
    ABOVE,@YOU WILL BE
    ALRIGHT.
```

will LIST as follows after BRUNning REM CHANGER:

```
100  REM

     THIS IS A TEST OF THE REM
     CHANGER PROGRAM AT WORK.
     NOTE THAT AS LONG AS YOU
     DO NOT GO PAST THE "
     " CHARACTER IN THE LINE
     ABOVE, YOU WILL BE ALRIGHT.
```

What happened? The utility will change *every* "@" it finds into a carriage return. Avoid using "@" other than as a proxy for carriage returns in programs through which you pass the utility. Or, if you want a learning experience, change the symbol the utility seeks to some other character.

```
030C: 8D F7 03   31          STA  $3F7
                 32  *
                 33  *
                 34  * DETERMINE LANGUAGE IN USE
                 35  *
030F: A9 4C      36  BEGIN   LDA  #$4C
0311: CD 00 E0   37          CMP  $E000
0314: 38         38          SEC
0315: D0 1E      39          BNE  ITSINT
                 40  *
                 41  * BRANCH IF NOT $4C, WHICH IS
                 42  * AT E000 IN APPLESOFT
                 43  *
                 44  * NOW DETERMINE LENGTH
                 45  *
0317: A5 AF      46          LDA  FPEND
0319: E5 67      47          SBC  FPSTRT
031B: 85 08      48          STA  PROGLEN
031D: A5 B0      49          LDA  FPEND+1
031F: E5 68      50          SBC  FPSTRT+1
0321: 85 09      51          STA  PROGLEN+1
0323: A5 67      52          LDA  FPSTRT
0325: 85 06      53          STA  PROGSTRT
0327: A5 68      54          LDA  FPSTRT+1
0329: 85 07      55          STA  PROGSTRT+1
032B: A9 40      56          LDA  #FPTOKEN
032D: 85 1A      57          STA  TKNSTOR
032F: A9 0D      58          LDA  #FPCR
0331: 85 1B      59          STA  CRSTOR
0333: D0 1C      60          BNE  MAINPROG
                 61  *
0335: A5 4C      62  ITSINT   LDA  INTEND
0337: E5 CA      63          SBC  INTSTRT
0339: 85 08      64          STA  PROGLEN
033B: A5 4D      65          LDA  INTEND+1
033D: E5 CB      66          SBC  INTSTRT+1
033F: 85 09      67          STA  PROGLEN+1
0341: A5 CA      68          LDA  INTSTRT
0343: 85 06      69          STA  PROGSTRT
0345: A5 CB      70          LDA  INTSTRT+1
0347: 85 07      71          STA  PROGSTRT+1
0349: A9 C0      72          LDA  #INTTOKEN
034B: 85 1A      73          STA  TKNSTOR
034D: A9 8D      74          LDA  #INTCR
034F: 85 1B      75          STA  CRSTOR
                 76  *
0351: A0 00      77  MAINPROG LDY  #$00
0353: A5 08      78  M1       LDA  PROGLEN
0355: D0 04      79          BNE  M2
0357: C6 09      80          DEC  PROGLEN+1
0359: 30 14      81          BMI  EXIT
035B: C6 08      82  M2       DEC  PROGLEN
035D: E6 06      83          INC  PROGSTRT
035F: D0 02      84          BNE  M3
0361: E6 07      85          INC  PROGSTRT+1
0363: B1 06      86  M3       LDA  (PROGSTRT),Y
0365: C5 1A      87          CMP  TKNSTOR
0367: D0 EA      88          BNE  M1
0369: A5 1B      89          LDA  CRSTOR
036B: 91 06      90          STA  (PROGSTRT),Y
036D: D0 E4      91          BNE  M1
036F: 60         92  EXIT     RTS

--End assembly--

112 bytes

Errors: 0
```

ROBOTIC SERIES:

OVERVIEW AND ORIENTATION

Michael Thyng

THIS is the beginning of a series of articles that will chronologize the "birth" of a robot. If you follow this series and build as the articles appear, month after month, you should be able to have a robot running in about one year. While that may seem like a long time, it really isn't for a project of this magnitude.

This is written with the common person in mind. That is, you don't have to be a technical wizard in either electronics or programming to succeed in this project. I am doing all the "leg" work for both you and me. I don't have all the expertise to do the things that you will read about. I do, however, have access to people with this needed expertise who assure me they are willing to help. They will bridge the gaps between what I know and what I need to know. I will include charts, graphs, sketches, circuit diagrams, theory, and appropriate computer programs so that if you follow, you will be able to complete the project. It will probably cost about $700.

...I always wanted to have a robot.

From about the time I was ten years old, I wanted to have a robot. I didn't particularly care where it came from, I just knew I had to have a robot. I suppose I didn't really believe I would ever have one, but that never bothered me. For Christmas 1982, my brother-in-law gave me a couple of books on robot building. An idea is about to come to life. I read most of the way through both books and started wondering why I couldn't actually build one. I had built Radio Controlled racing cars, so I knew that an aluminum, fiberglass, or metal robot framework would be no problem. I've been programming commercially since 1970, and I figured I could program any "on-board" computer I might use for robot intelligence. Well, that just left a little matter of electronics.

Being a fairly active member of *Call-A.P.P.L.E.*, I met a fairly high number of people well versed in electronics. Some were actually anxious to see a project like this go from start to finish. So, I stopped saying to myself "if." And started saying "when." Besides, Uncle Bob once told me: "Kid, there are two kinds of people in the world - doers and talkers. What kind are you?"

...I stopped saying "if" and started saying "when".

Well, I've decided to grab the bull by the tail and face the situation squarely. I'm going to build a robot. And I'm going to do it right. That means that I will approach it the way a competent systems analyst would approach a business system. This requires that I follow some version of the following steps:

1. Define the problem
2. Establish the scope or limits
3. Get the user's approval
4. Design the system
5. Design the programs
6. Test the system
7. Implement the system
8. Get the user's approval
9. Evaluate the system

I will answer all reasonable questions as quickly as possible either by return mail or through this column. If you are interested in contributing ideas to this project, *write* to me at:

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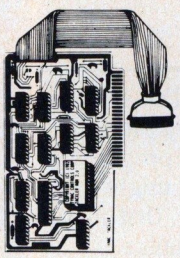

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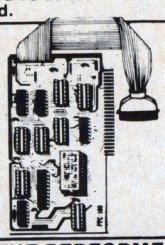

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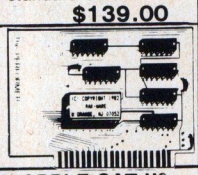

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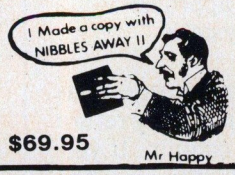

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VIEWS ON HUES

Michael Thyng

I usually like to give you a revelation. You can draw all the Lo-Res patterns you want with only three instructions. I was amazed when I discovered that. There are, of course, more Lo-Res commands to deal with, but three are all it takes.

The first command is GR. This puts you into the Low Resolution graphics mode. This will clear the screen and allow you to plot pictures, graphs and charts. It is called low resolution because the smallest plottable character is about a quarter inch square (depends on your screen size.) That, to a screen output, is not a very fine resolution.

We can illustrate this by plotting the graph of a diagonal line. Enter this program:

```
10 GR
20 COLOR = 10
30 FOR S = 0 TO 39
40 PLOT S,S
50 NEXT S
```

Type RUN. Notice how the diagonal looks like escalator steps. That shows that we are using low resolution graphics. If we were plotting in high resolution, that diagonal would have appeared as a line. That is the difference.

To get out of the graphics mode, type TEXT. A little hint worth a thousand commands.

The next major command is COLOR. Sure, this is fairly obvious. There are, however, a couple of things you should know. Your background color, on a color monitor or color TV, is black. The color you are choosing is the color of the character you are going to plot. By the way, the only *character* you will be plotting in Lo-Res is the little quarter-inch squares. If you want a different background color, you will have to command that to happen. Yes, I will show you how.

Colors are set or chosen by equating the reserved word COLOR to a number from 0 to 15. See line 20 in example 1. Reserved words are listed on page 122 of your Applesoft Manual. The restrictions applying to their misuse are explained on pages 7, 8, 38,64, 87, 148, and 123. I'd rather not discuss them now.

The Apple][divides the Low Resolution display screen into 40 horizontal plottable positions and 40 or 48 vertical positions. For business, school, demonstrations, and most games that I've played, I prefer the 40 position mode. If you use the 48 vertical position mode you can fill the screen with color but it doesn't leave any room for text. In the 40 character mode (vertically) you can have four lines of text. That gives you a place to put labels, comments, data, and graph scaling. It is also the mode I recommend for most applications, and the mode we will use today. So we have a screen divided into a 40 by 40 display surface.

How do you imagine we cause the little color squares to fill in the screen? Sure. You tell the Apple which spot to plot with a vertical and horizontal address or location. The command you need is called PLOT. It looks like PLOT 20,30. The first number, 20, is the horizontal address and the second, 30, is the vertical address or location.

If you have ever studied algebraic graphing, you may recall the X-Y coordinates are simply the horizontal and vertical distances away from the origin. (At least in the Cartesian Coordinate system.) PLOT works almost like that.

You see, the screen has its orientation with the origin (0,0) at the upper left hand corner of the screen. The horizontal address (the X coordinate, if you will) works exactly the same as a first quadrant value for X. The larger the value, the farther to the right you go. Remember the limit is 40.

With the vertical address, it is just the reverse of what you were taught in algebra. Since you start in the upper left hand corner of the screen, the only direction you can go and still remain on the screen is down. Therefore, the larger the value of the vertical address (the Y coordinate), the farther down the screen you go.

Let's try a couple of examples, and then I will tell you about some other Lo-Res commands.

Example 1

```
10 GR
20 COLOR = 9
30 PLOT 20,30
```

Type RUN, and see what it does.

Exciting, isn't it? Well, we have to start somewhere. Now let's fill the screen with those little squares. Change the program so it looks like this:

```
30 FOR V = 0 to 39
40 FOR H = 0 to 39
50 PLOT H,Y
60 NEXT H
70 NEXT V
```

Now type RUN. This gives you a whole screen of some color. This is one way to change your background to a color other than black! Did you pay attention to how long it took to fill the screen this way! On my computer it takes approximately six seconds. This is a little slow. Let's find a faster way to fill the screen.

There is a command we could use called HLIN. That stands for Horizontal LINe. At least, it could. With this command you specify the starting and ending points of the horizontal line and also which vertical position to draw it into. Think of the two numbers before the AT as your choice for line length. The number after AT think of as a place to put the horizontal line whose length you have specified. We would revise our program to look like:

```
10 GR
20 COLOR = 9
30 FOR V = 0 TO 39
40 HLIN 0,39 AT V
50 NEXT V
```

This fills the screen from top to bottom. I timed this one on my system – .4 seconds. Use these timing numbers for benchmark references, not hard and fast times that you can be guaranteed on your system.

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VIEWS ON HUES

There is also a vertical counterpart to HLIN called VLIN. Rewriting our program using VLIN, we get:

```
10 GR
20 COLOR = 9
30 FOR H = 0 TO 39
40 VLIN 0,29 AT H
50 NEXT H
```

Type RUN. Again, a speedy screen fill. But this time, it fills left to right.

We now have the tools we need to use the Lo-Res graphics for some business functions. Let's graph monthly sales figures for the last three years for a manufacturing company. Call it A Z MFG. They make mirts.

We do have to make a few concessions. Specifically, we don't have A Z's actual sales data. So we're going to make up the data using a random number generator. This is done in lines 110 and 120. If we did have actual sales data, we would probably have to worry about scaling. Scaling is a process of factoring the data to be graphed into 40 segments so it will fit on the Lo-Res screen.

Enter the following program and RUN it before going on.

Example 2

```
10 REM LO-RES SALES
   GRAPHING
20 DIM S%(36)
30 GR
40 COLOR = 9
50 FOR H = 0 TO 39
60 VLIN 0, 39 AT H
70 NEXT H
80 COLOR = 11
90 X% = RND (8) * 100
100 IF X%>39 THEN 80
110 S%(N) = X%
120 N = N + 1
130 IF N<37 THEN GOTO 80
140 FOR H = 1 TO 36
150 VLIN S%(H), 39 AT H
160 NEXT H
200 PRINT " 3 YEAR MIRT
    PRODUCTION"
```

Non-beginners, yes I could have used only integer variables in this case. I simply chose to mix. Notice the labeling under the graph. The "+" shows where the years start. Below that, I labeled the graphs so anyone looking at the graph will know what it is graphing. This is important. Never show a graph without a label. Anyway, it is a boring graph. To improve it, let's make each year a different color. Add these two lines.

Example 3

```
142 IF H>12 THEN COLOR= 12
144 IF H>24 THEN COLOR= 5
```

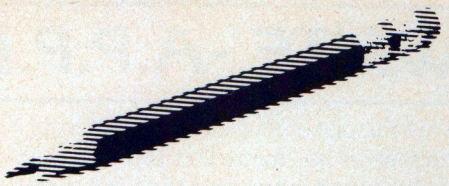
RUN the program now. The two new lines do not reflect the ultimate in programming logic, but they get the job done in a straightforward manner, and it is easily understood. You could customize the graph more to your needs by color coding each month, or color coding by quarters. Typically we would want to know when our sales of mirts made a profit and when they didn't. The following changes make our graph show that.

Example 4

```
142 IF S%(H) < 20 THEN 175
144 COLOR= 1
170 GOTO 200
175 COLOR= 5
180 VLIN S%(H), 19 AT H
185 COLOR= 1
190 VLIN 20, 39 AT H
195 NEXT H
```

Type RUN. Isn't that neat! I really like it. This was supposed to be light, but I guess I got carried away. Oh well, it's all valuable information. SAVE the program you have in your Apple now. I think it will come in handy for your own business or home applications. Maybe we will try some scaling and disk input next time that we can use this graph. Perhaps we will develop a program that you can use to draw on the screen accessing 16 colors without game paddles.

WRITE -A.P.P.L.E.



The Readers

Recalling Total Recall

Dear Editor,

WHILE reading the excellent article "Total Recall" in the August 1982 issue of *Call -A.P.P.L.E.*, I noticed what appears to be an accidental omission in David Linker's & SWAP routine. Specifically, on page 20 between lines 84 and 85 the following two assembler lines should be added:

```
BIT  VARNAM
BMI  SWP2
```

I refer you to lines 301 and 302 of "Print Using and Friends" in *Call -A.P.P.L.E. in Depth #1.* Without this addition, Integer (%) array values would not be swapped correctly because three bytes would be swapped instead of the required two, swapping more than the user bargained for.

Since David's "Total Recall" doesn't & SWAP integer array values, this addition is not required for proper execution of his program, but if your readers use & SWAP for their own programs, they should make the above change, just to be on the safe side.

David's use of the RUN command in line 1000 to allow active arrays to be redimensioned was a novel idea. There is another approach which is quite simple and doesn't require that a program be reRUN: POKE 109, PEEK(107): POKE 110, PEEK(108). This deletes all the arrays and *only* the arrays by placing Applesoft's beginning of array space pointer into the end of numeric storage pointer. I refer you to page 140 in the Applesoft Basic Programming Reference Manual. If the POKEs are followed by a FRE(0) command, the string space will be swept clean in the blink of an eye, and the program will be ready for new array storage.

Call -A.P.P.L.E. is always interesting reading. Keep up the good work!

Craig Peterson
1743 Centinela Ave #102
Santa Monica, CA 90404

Author Gets Paddled

Dear Editor,

I believe Mr. Little was quite incorrect in his description of Apple paddles in his article "Ins and Outs : Part One" (June 1982). Mr. Little writes "If the timing circuit is 'charged up,' the amount of time it takes to 'discharge' will depend on the position of the dial." What one might assume that Mr. Little meant by including "discharge" in quotes is that the timing circuit is doing something like "discharging" under the control paddles. The fact is, the timing circuit is doing nothing like discharging at this time. It is charging. It would be a simple correction if the author just had things backwards. Unfortunately, he goes on to state that location $C070 "charges up" the timing circuit, leaving the reader with the impression that the initial charging is instantaneous. This statement was not merely backwards, it was simply wrong. What Mr. Little has gotten right is that the paddles and a timing circuit is involved in the process. Since the finer points are in all but a rare case transparent to the user, many readers may be satisfied with this understanding and ought to skip to the next letter to the editor.

The article should have read that location $C070 triggers a timer which allows the circuit to start charging under control of the paddle. When the timer circuit is completely charged, location $C064 (for paddle 0) will fall below 128. Ambitious readers may verify what follows by looking at page 114 of the Apple Reference Manual and securing specification sheets for the following chips: 74L5138, 558, 74L5251. This description is a hardware view of a read paddle 0: When the value $C070 comes across the address lines, the I/O decoder (74L5138 at 7:00 on the schematic) pulls its pin representing 7 (pin 7) low. This pin is connected to a timer (pin 3 of the quad timer 558 at 3:00), whose low value triggers it. Output of the timer (pin 1) will stay high until the timing period is completed independent of further trigger conditions. The timer chip's datasheet explicitly states that while its output is high, its input circuit is charging, not discharging. The timer's input circuit is composed of a potentiometer in the paddle and a capacitor on the board. When the timer (558) is not in use, it (pin 2) grounds both the current flowing from the pot and from the capacitor (if any). After triggering, the timer stops grounding input thru pin 2, allowing the capacitor to charge from the current now flowing to it from the paddle. When voltage to pin 2 builds to ⅔ of the 558's supply voltage, output pin 1 goes low. This output is allowed onto the bit 7 line of the data bus by another chip (the 74L5251 directly to the left of the 558 on the schematic) when $C064 comes on the address lines. (Digit 6 is decoded by 74L5138 enabling 74L5251 to decode the lower 3 bits of the address bus. This value being a 4, it makes its output the same as the value at its fourth line — pit 15 — connected to the output pin of the timer). As long as the capacitor is charging, output from the timer is high, bit 7 will be high on the data received from querying $C064. The lower the resistance paddle 0 puts up, the faster the capacitor will charge, the faster the timer will trip, the quicker location $C064 will go below 128, and the smaller the counts will be by programs timing this process.

The fact that the paddles are charging (and not discharging) when they are read will help owners of older Apples to understand an early bug with paddle reading. If the paddle was read in too quick succession by an Integer Basic or assembler program, paddle readings would go on the fritz. This was because the capacitor took a longer period of time to discharge. (If memory serves me correctly this was because a resistor was placed between the capacitor and the timing ("input") pin of the 558 and not adjacent to it as it is now.

—◉→

This misplacement caused discharge current to be channelled through the resistor thus increasing the discharge time considerably.)

John Messerly
Blade Software
12453 Stanwood Place
Santa Monica, CA 90066

Tom Little's reply:

I will not dispute Mr. Messerly's detailed description of the operation of the Apple game paddles. However, I do not believe the statements made in "In and Outs" were incorrect.

The purpose of the article was to explain Apple I/O in a manner understandable to persons with a background in programming, rather than electrical engineering. Avoiding the technical aspects of a subject always leads to simplification or overgeneralization. This is not necessarily bad, since the human mind's versatility is due, in the large part, to its ability to perform abstraction.

The words "charge" and "discharge" were enclosed in quotation marks precisely to avoid the type of problem brought up in Mr. Messerly's letter. The use of quotation marks to indicate that the terms are not to be taken literally is quite standard. I used these words simply because for most people not familiar with electronics, "charge" carries an active connotation (i.e. the user "does something" when he "charges" a circuit), whereas "discharge" carries a passive connotation (the circuit "discharges" when left to itself). Furthermore, the datum returned from a paddle read is a high voltage after the timing circuit is reset, and drops to a low voltage some time later. Thus, as a programmer, thinking of "charging" and "discharging" as described in the article makes some sense, even if the specific IC Mr. Messerly describes may be doing something different entirely.

Also, no reference was made in the article to which components were "charging" and which "discharging". No statements were made regarding any particular voltages anywhere accept on the data bus itself. In fact, it is the charging and discharging of the capacitor (C8) which are responsible for the time-dependence of the circuit.

I recalled after reading Mr. Messerly's letter that there are references in the literature to the timing circuit charging and discharging (in the technical sense), and if this has caused any confusion, I apologize.

Finding the appropriate level at which to describe a phenomenon is always a problem, in any field. One must take care not to interpret high-level statements too literally or specifically.

Tom Little
800 Cielo Circle
Las Cruces, NM 88005

More Efficient Code

Dear Val,

We read C.J. Welman's "Patching the Free Space Patch" in the June, 1982 issue and thought his comments on writing efficient code were very timely. We see a lot of assembly code written very poorly.

In addition to the suggestions Welman gives for writing concise code, we'd like to add two more.

1) If you see branches crossing all over each other, there is probably a neater way of writing.
2) Don't get trapped into a form used by a previous programmer.

We looked over Listing 4 and came up with an equivalent method that is not only 25% shorter for that section, but probably easier to understand. It is as follows:

Change lines 18–32 as follows:

```
LDA $B3F2,6 ;This was the bug!
            Was $B3F3
ASL         ;Shift Hi Order into
            carry
BCC $BA77
INC $40     ;No sector available
BNE $BA63   ;Need to bump Hi-
            Byte?
INC $41     ;Yes
BNE $BA63   ;Go count
            somemore?
DEY         ;Decrement index
            and go check
BNE $BA6B   ;If done
```

Change address in original line #36 to $BA88.

Valerie A. Floeter
Alan D. Floeter
4333 N. 71 Street
Milwaukee, WI 53216

File Dump Generates Interest

Dear Val,

If Lee Reynolds (FILEDUMP command, June 1982 issue) is looking for more free memory space in DOS for nifty/useful commands such as FILEDUMP, how about using the space ($A252-$A270) where the MAXFILES command used to live? Since using FILEDUMP inactivates the MAXFILES command, this space should be available for exploitation.

Hope this can help someone since so many others have helped me.

Duncan MacGregor
2110 Regis Dr.
Davis, CA 95616

P.S. I am in the process of starting a User's Group in this area. Any assistance/information you could provide would be of great help.

CONTACT International Apple Core, 910-A George St., Santa Clara, CA 95050 for information on forming a user group.

Dear Val,

The new DOS command, Filedump, looked like something that I had been waiting for, *except* for one thing, MAXFILES is a command that is used in several of the programs that I use fairly often. So, I decided to check thru the DOS commands as listed in my copy of Beneath Apple DOS. The fifth command in line was the command CHAIN — I didn't remember ever using CHAIN. And I hadn't. It appears that CHAIN is only used from within Integer Basic programs to transfer all variable values to a following Integer Basic program. I had found the command to replace.

The new name had to fit within five characters. Since this is being used to display text files, we used the name TDUMP. This requires two changes from the listings in the June *Call -A.P.P.L.E.* To change the command table enter:

```
A893:54 44 55 AD D0
```

The new command handler entry pointer table becomes:

```
9D26:DE BC
```

The routine starting at $BCDF remains as listed in the June issue.

I put the following line in the Hello program to make TDUMP a part of DOS.

```
REM
        TDUMP
16  HEX$ = "A893:54 44 55 4D D0
    N 9D26:DE BC N BCDF:20
    8E FD 20 A3 A2 20 8C A6 F0
    05 20 F0 FD D0 F6 20 FC A2
    60 N D7D2G": FOR I = 1 TO
    LEN (HEX$): POKE 511 + I,
    ASC (MID$(HEX$,I,1)) + 128:
    NEXT : POKE 72,0:CALL -144
```

And to steal the last line of the article, happy TDUMPing.

Robert G. Ragsdale
4818 Cleveland St.
Hollywood, FL 33021

Dear Val,

Although I recognize that the purpose of Lee Reynolds' "Restore to a Line Number Routine" was to develop a good application for the USR function, I think there is a better way to RESTORE. I may be reminding you of something which is well known, but essentially the same result can be obtained with POKE 125, PEEK(121): POKE 126, PEEK(122) executed before the desired DATA statement and after the previous one. This can be implemented in several ways.

If the DATA statements are scattered throughout the program where they are used, you can POKE, DATA, and READ in separate statements. If the DATA statements are grouped together at the beginning of the program, as Lee describes, each group can be preceded by POKE 125, PEEK(121): POKE 126, PEEK(122): RETURN, either on a line prior to the first DATA statement or on the same line as the first (or only) DATA statement in the group. Then the data would be accessed by a GOSUB N, where N is the line number of the POKE statement, just before the READ. This is very similar to doing a RESTORE N before READing. The advantage of this method over the USR is that the program can be renumbered more easily.

I love the FILEDUMP command (June, 1982). However, I changed it to TYPE to be consistent with other environments that I frequently use, CP/M and IBM CMS. To allow for the shorter keyword, I added the following loop: FOR I = 0 to 24: POKE 43243+I, PEEK(43247+I): NEXT, which moves the following keywords down.

James A. Petrich, Ph.D.
5123 Sirretta
San Antonio, TX 78233

Micro Feasibility Study

To the Editor:

The International Statistical Programs Center (ISPC) of the Bureau of the Census, is conducting a project to study the feasibility of using microcomputers in national statistical offices in developing countries.

We are attempting to make contact with overseas microcomputer users, particularly those in developing countries, to gather information for this project.

The study is focusing on hardware, software, and the approaches to processing which will take into account the budgets, levels of experience, types of processing, and computing environment generally found in developing countries.

If any of your readers has relevant information on this subject, I would like them to write or call me at (301) 763-2750.

The results of this study will be made available to you if you so desire. Thank you for your contribution to our project.

Robert R. Bair
Assistant Chief
for Data Processing Activities
International Statistical
Programs Center
Bureau of the Census
Washington, DC 20233

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First of all, LOCKSMITH is slow! Sad to say, LOCKSMITH doesn't have the ability to copy "locked" discs (or unlocked discs, for that matter) in 45 seconds (as claimed on behalf of another nibble copy program). Even under the best of circumstances, LOCKSMITH takes many minutes to make a copy. You just can't mass produce pirated copies with LOCKSMITH, even if you have figured out the appropriate LOCKSMITH "parms" necessary to modify LOCKSMITH to copy through the latest copy protection scheme.

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So don't buy LOCKSMITH for piracy, but only to make archive copies. But we'll go even further. We think it doesn't make a lot of sense to buy LOCKSMITH to make archive copies of any program which is published with a reasonable backup policy. If a backup is included with the original disk, and no-fault replacements are available at nominal cost, why spend $100 to purchase LOCKSMITH? If a company is charging $5 per copy for a replacement disk (we charge $3, for LOCKSMITH) it takes a lot of blown disks to make up the $100 LOCKSMITH price. Probably more than you'll ever have.

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Now we come to the question of what's reasonable? Well we replace destroyed LOCKSMITHs for $3.00 plus the returned original. And we now supply two disks with each LOCKSMITH package (not merely one copy of LOCKSMITH on each side of one disk). While LOCKSMITH is a program that is vital when you need it, it is not a program which gets used every day. Even so, if you need it, you need it.

There you have it. We suggest that you DON'T BUY LOCKSMITH if the publishers of the programs that you do buy are reasonable about their policies. We're so convinced about this, that effective immediately, we will no longer support parm listings for programs which are sold with reasonable replacement policies. As there is no industry standard, at the moment, we've invited some other interested parties to meet with us to discuss setting up standards. For the time being we will define "reasonable" as requiring a backup disk to be included free with the package for business and utility software, (but not for games) and blown (original) disk for new disk replacement for $5.00 (including postage) or less, for both games and business programs. Thus, with this new policy, you will no longer have our help to backup disks for programs complying with these policies, and therefore LOCKSMITH will not be very helpful to you, for such programs.

What will happen if ALL software publishers decided to adhere to these standards? In that case, we'd be out of the LOCKSMITH business. But that wouldn't bother us, particularly, because that would mean that the industry had taken a great step forward. In the meantime, if you have a program without backup, that is vital to your business, or have spent $40 for a game that the manufacturer refuses to even think of selling replacements for, ask for LOCKSMITH™ 4.1. Because at the moment, it is clear to us that most of you DO need LOCKSMITH.

LOCKSMITH™ 4.1 is available from us, or your local dealer. Visa and MasterCard users call Toll Free 1-800-835-2246. Kansas residents call 1-800-362-2421 or send $99.95.

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(A note to software publishers. If you have a replacement policy which qualifies to our standards, or something similar, and would like us to not support the "parms" for your program, please write.)

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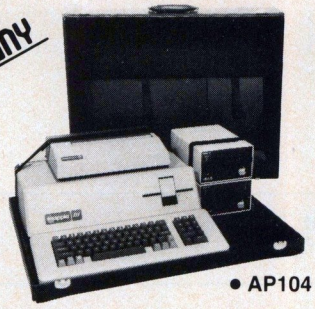

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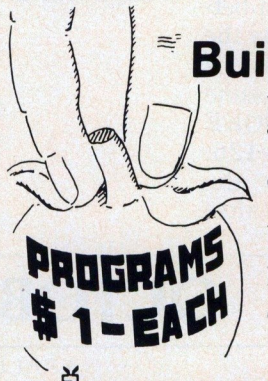

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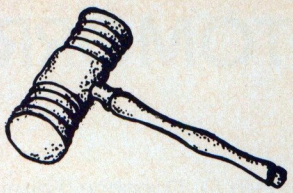
A.P.P.L.E. MEETING MINUTES



Dave Lingwood/Secretary

August 22, 1982
Swan Computers, Bellevue

PRESIDENT Dick Hubert called the meeting to order at 7:50PM, with 55 members and guests present.

Old Business:

The June, 1982 minutes were approved as published in *Call -A.P.P.L.E.*

Treasurer's Report:

Bob Clardy reported July sales of about $123K, and $122K expenses. Receivables total $150K, and there is an effort underway to reduce this amount. We have about $220K in savings and certificates of deposit. GPLE is now our hottest-selling software product.

New Business:

Dick announced that the Club products catalog will be mailed to members this week. There are several interesting new items.

This Fall's classes will be held in the West Seattle editorial office.

The meeting was adjourned at 8:55PM.

Q&A:

GPLE goes away mysteriously if you have a Non-Apple 16K card without Integer or a ROM on it. You must have DOS or a language loaded on the card first.

Steve Ross noted that some commercial software won't run if you re-burn your monitor ROM to keep it from converting lower to upper case. It seems some programs compute a checksum on the whole monitor to make sure the user isn't doing sneaky copy protection avoiding things.

Several questions covered monitors — the one-eyed variety.

Speakers:

Paris visitor, **Dr. Richard Marks**, spoke about Apples in France, and of his work to adapt the Apple keyboard and the Novation Apple Cat to the French language and governmental standards. Software and documentation translation from English is a great barrier to the spread of U.S. micro technology into France.

The Apple *III* is selling well there, however, perhaps at a higher ratio to][sales than in the U.S. Professional and business users predominate.

The French Videotext experiments are aiming for 300K - 500K installed homes in the next two years. Acquistion of databases is more of a difficulty than the technology. There is experimentation in using Apples to hold databases for videotext terminals.

Mr. Ratan Lalchandani, President of Xiten Systems, demonstrated his company's Gallium 10 meg hard disk. It uses Tandon drives at 8,600 b.p.i. density. The in-unit controller can access up to 4 drives, each with three double-sided platters.

The system uses a slot/drive/volume# access system. The DOS limit is 409K per volume, organized in 50 tracks of 32 sectors each. The user can choose three different volume sizes. It works with DOS, CP/M or Pascal, and the user can have all three types of volumes on at the same time.

A.P.P.L.E. SOURCE INFO

A.P.P.L.E. is now up and "on-line" with an electronic version of *Call—A.P.P.L.E.* magazine. The "Closed User Group" is open to current Club Members only and features up-to-date Club News and New Product Releases, Full Product Catalog, Ordering Information, and Selected Program Listings (for downloading) to your system) from *Call—A.P.P.L.E.* magazine. More services/feature, including a Technical "Hotline" via Source Mail, are to be added in the near future.

To access our special service, simply enter the SOURCE COMMAND MODE, and type:

>CALL—APPLE

You will be presented with a menu of options to choose from and may easily move about the system via the self-prompting menu displays. If you need further assistance, type "H" or "HELP" at any time for a list of commands or consult your SOURCE Manual.

If you already have a SOURCE account and have not registered with us, here is what to do:

Send a message via SOURCE mail to ST1570 and include your name, membership number, and SOURCE ID. We will usually update our SOURCE member database within 24 to 48 hours. Until that time you will have only limited access within our closed system.

If you are applying for SOURCE membership for the first time, we will in addition require a Visa or Mastercard number and expiration date. This is *required* by the SOURCE for billing your system time charges.

For non-A.P.P.L.E. members, you may have limited access to our system. One selection on the menu will provide you with complete information for becoming a member of A.P.P.L.E., the world's largest Apple computer user group.

We look forward to serving you.

TOMORROW'S APPLES TODAY

Kevin O. Donohoe/Editor

APPLE OFFERS COMPLETE APPLE /// SYSTEM FOR BUSINESS PROFESSIONALS

The Apple /// Professional Solution combines into one package in Apple /// with 256K of internal memory and a built-in floppy disk drive; a 12" Monitor ///; Apple software programs for word processing, financial modeling and data management; and specially designed training aids.

The specially priced Apple /// Professional Solution will be offered by participating U.S. and Canadian authorized Apple dealers from August 1 through October 31, 1982. The U.S. suggested retail price is $4995. If purchased separately, these products would cost over $5300.

The 256K Apple /// is a desktop computer system that has sufficient memory capacity and versatility to handle the complex application needs of managers, business owners, doctors, lawyers, architects, and other professionals. With the following Professional Solution software, business professionals can use the Apple /// to organize facts, compute numbers, track progress, and write reports:

- Apple Writer ///: a word processing program for writing, revising, editing and printing all types of documents.
- VisiCalc ///: an electronic worksheet that helps professionals plan budgets, create forecasts, and develop pricing strategies.
- Quick File ///: a new product from Apple Computer which turns notes, receipts, lists, and schedules into coherent files and reports.

Training Program

The Apple /// Professional Solution also includes an Introductory Guide which acquaints the user with unpacking and connecting the system, introduces the keyboard, and describes both basic and potential uses of the Apple /// Professional Solution.

Product training tutorials for Apple Writer ///, VisiCalc ///, Quick File ///, as well as the System Utilities disk, which comes with the Apple /// computer, are also included in the package. These tutorials are designed to quickly teach users the basics of each program. Once through the tutorial, users can immediately apply these software programs to their work.

HOLLISTER MICROSYSTEMS INC. EPROM PROGRAMMER CARD FOR APPLE II® PROGRAMS 2716, 2732, 2732A, 2764 AND 27128 EPROMS

Hollister MicroSystems Inc. has announced a self-contained plug-in card for the Apple II® computer that programs a variety of EPROMs and can also be used as a straight read-only EPROM memory card.

Called the HMS3264™, the card boasts a wide range of programming capabilities. It handles the newer 2732A (32K), 2764 (64K), and 27128 (128K) EPROMs as well as older types such as the 2716 (16K) and 2732 (32K), and is supplied with easy to use menu-driven software.

These require 21-V programming voltages, while the older types require 25-V programming voltages. The HMS3264 supplies both programming levels, as well as proper socketing for the older and newer types.

The powerful menu-driven software for the HMS3264 gives the user a maximum of flexibility. He can program any portion of the target EPROM from any portion of the Apple II's RAM memory or from any portion of any appropriate binary file on diskette. This allows a 'mix and match' capability, meaning that the target EPROM can be burned and verified using portions of several programs from several sources. For example, the data in four 2761s could be consolidated and programmed into one 2764, or vice versa. And with a cross-assembler, the HMS3264 becomes a very powerful but inexpensive software development system.

The card also provides for monitoring of the programming on the Apple II's video screen, via updates at 1-byte intervals.

Among the on-card features of the HMS3264 is a programming-voltage enable/disable switch, which protects programmed EPROMs (when the card is used as a memory) from possible inadvertent programming attempts.

The HMS3264 costs $395 each in unit quantities, and OEM discounts are available. Delivery is from stock. For more information, write or call Brent C. Olson, Hollister MicroSystems Inc., 5081 Fairview, Hollister, CA 95023, (408) 637-0753.

ON THREE

ON THREE is the new reference source for the Apple /// computer. More than just a magazine, it is a complete service for Apple /// owners and users. Each month we will bring a magazine filled with useful articles that the average person can understand. From helpful tutorials on all of the ///'s languages, to reviews of the latest in software and hardware, we will bring you the best the Apple /// has to offer.

The premier January issue will focus on utilities, there will be a Pascal program to give you extra disk space, and three invokable modules that will make your life easier. One program you shouldn't miss is our Character set and graphics editor. Sharing the center stage will be an article on the SOS directory structure. Also featured will be reviews of popular word processors and printers.

Coming soon will be a Bulletin Board service for those of you with modems. Here you will find news and views on the /// and various articles that we didn't have room to print.

If you subscribe before December 12, 1982, you'll get 12 issues for the price of 10. For a full year of information on the Apple ///, send your name, address and $30 to: ON THREE, P.O. Box 3825, Ventura, Calif. 93006

Dealer inquiries are invited. Group rates will also be available. Contact the above address for more information.

LCM-100

The LCM-100 is a line carrier modem. It functions as a transceiver whose signal is carried over the AC power lines in a building. It supports a "3 wire" RS-232C communication in this environment. Other RS-232 control signals are simulated under jumper control. Two units make up the communication link: The first, attached to the Data Communication Equipment; the second, to the Data Terminal. You get both, data rates to 9600 BAUD, for only $315. Write: CRC, 1720 130th N.E., Bellevue, or call, (206) 881-9550, for info.

DECODER/INTERFACE PERMITS MOUSE TO OPERATE WITH PERSONAL COMPUTERS

A decoder/interface system which allows a **Mouse** pointing device to be used with Apple, IBM and S-100 personal computers has been introduced by Random Access, Inc.

Available with larger computer systems by Xerox, Digital, Hewlett-Packard and others, the Hawley **Mouse** is a high-resolution *digital* input device which has not previously been generally available for personal computer use.

When joined by the Random Access Decoder/Interface to a personal computer, the **Mouse** moves the cursor on a computer display screen in direct proportion to its own movement. Capable of precise relative or absolute positioning of the display cursor, the **Mouse** is not restricted to a fixed tablet area or the limits of a single screen display.

The **Mouse** can be used for transferring drawings to the computer or will move the cursor directly to any point on the display screen. With three buttons for software-defined functions (i.e., selecting, activating and toggling menu items or displayed objects) the **Mouse** eliminates many keyboard strokes and functions. It also allows direct, instant selection and activation of symbols in menu-driven software.

The decoder/interface has built-in totalizers to convert button and motion signals from the **Mouse** into computer readable form. It encodes movement on the X and Y axes into 16-bit displacement values and provides the interface to a host computer in either 8 or 16-bit parallel form.

The unit is composed of a decoder and a host interface card. The **Mouse** plugs into decoder logic housed in a small cabinet located external to the host system. The interface card plugs into the user's system and is connected to the decoder by means of 2.5" ribbon cable.

Details on the Hawley **Mouse** and Random Access Decoder/Interface may be obtained from Random Access, Inc., 246 Highland Road, Pittsburgh, PA 15235.

ES-CAPE — A NEW APPLESOFT EDITOR

S-C Software Corporation announces ES-CAPE (Extended S-C Applesoft Program Editor), a programmer's tool to speed up and simplify the development of Applesoft BASIC programs. ES-CAPE provides a split-screen editing window: you can LIST a portion of your program in the upper window and independently edit other lines in the lower window. Editing functions include character insertion and deletion, line truncation, and simple entry of lower case and control characters.

Other major features: global search and replace, DOS command menu, automatic line numbering, list control, user-definable keyboard macros, variable display, and much more! ES-CAPE is user-friendly; most commands are a single keystroke. There is no need to memorize; three menus remind you of every command and macro.

The introductory price of $40.00 includes both regular and RAM card versions of ES-CAPE on a copyable diskette, the comprehensive manual and a quick reference card.

ES-CAPE is available from S-C Software Corporation, 2331 Gus Thomasson, Suite 125, Dallas, Texas. Phone: (214) 324-2050.

COLOR GRAPHICS FROM APPLE COMPUTER TO HARD COPY

Target Software offers a program that converts your computer graphics on the monitor (CRT) to color slides, paper or transparencies — in patterns using up to 16 colors. The company offers a program called Target Image Maker that is designed to reproduce computer graphic layouts generated with an Apple Computer using the Apple Plot or Apple II Business Graphics programs. Using the Target Image Maker program, the graphic pattern is transmitted to a graphic production center over the COMSHARE communication network. The normal delivery schedule is 48 hours. In addition to the cost of the communications program, there is a charge for the various graphic patterns — depending on the type. Each original color slide is $10 and additional copies are $4.00. Paper originals are $5.00 and extra copies are $2.75. For further information contact a computer dealer that handles the COMSHARE line of software or write to Lori Pattilo, Sales Administrator, COMSHARE Target Software, 1935 Cliff Valley Way, Suite 200, Atlanta, GA, 30329. (404-634-9535)

SUPER-RATT

With the Super-Ratt radio-teletype and CW program for the Apple II, you can have your own RTTY RBBS station on-line quickly and easily, according to Universal Software Systems of Ridgefield, Connecticut. Super-Ratt is the lowest priced RTTY/CW program which also contains a full Radio Bulletin Board System.

The program will operate in ASCII as well as Baudot at any speed from 40 to 300 baud. CW speeds range from 5 to 100 WPM, with an automatic speed adjust on receive.

The program may be run in either manual or RBBS modes. Extensive use of disk files permits storage of "canned" material for manual operation. In the RBBS mode, the system automatically saves nearly one hundred user messages to the disk.

There are thirty-five different commands on the RBBS. They are all simple English words — and quite memorable.

Almost any modern terminal unit or converter, such as iRL, Flesher, Kantronics, HAL, or others can be used with Super-Ratt as well as such devices as the "RADCOM" card by AF6W.

The program is not protected against copying. The BASIC portion may be listed and modified to suit your tastes. (The registered owner's call is installed in the machine code by the factory.)

A free one year subscription to the user newsletter, "THE RATT'S NEST", is included in the purchase price of $59.95, which covers shipping via UPS or first class mail.

For a complete data sheet write or call Universal Software Systems, Inc., 9 Shields Lane, Ridgefield, CT 06877. (203) 438-3117.

CRYPTANALYSIS FOR MICROCOMPUTERS

Cryptanalysis for Microcomputers is an essential guide to creating and solving coded messages and puzzles with a microcomputer using BASIC programs.

Written by Caxton C. Foster and published by the Hayden Book Company, Inc. of Rochelle Park, New Jersey, the book examines most of the well-known cipher systems in addition to some of the newer, less known systems.

As each cipher is presented, the methods of enciphering and deciphering messages are explained, if the secret of the system is known. Standard hand methods of solving ciphers when the system is not known and how these methods can be revised to take advantage of computers are also looked at.

The book includes seven appendices that help break codes. They consist of: letter frequency per 10,000 letters, terminal and initial letters, frequency of English digrams without regard to word boundaries, top 1,000 words from Brown Corpus, most common words by elngth from Brown Corpus and pattern words that appear two or more times in the Brown Corpus.

CRYPTANAL FOR MICROCOMPUTERS by Caxton C. Foster, 6 x 9, paper, 333 pp, $14.95, ISBN-0-8104-5174.

DIRFIX

Seven Mile Systems, Inc. announces the immediate availability of DIRFIX, an APPLE PASCAL program that will allow you to easily recover from damaged disk directories and accidentally removed disk files.

DIRFIX studies the contents of an APPLE PASCAL disk directory looking for and repairing errors in that directory. DIRFIX will then analyze the data on the rest of the disk, looking for Text files and Code files that are 'missing' from the disk directory; these files too are returned to the disk directory.

If you use the APPLE PASCAL system for professional word processing, business data processing, program development or just casually, you know that your disk files are an important and valuable asset. Protect that investment and give yourself some added peace of mind with DIRFIX.

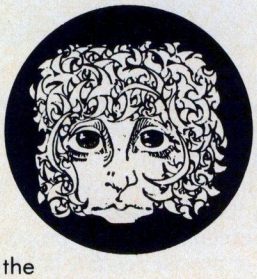
DIRFIX is available on a standard format 5-¼inch APPLE PASCAL floppy disk for use in an APPLE DISK II disk drive and is accompanied by instructions that are very easy to follow.

DIRFIX requires an APPLE II or APPLE II+ with the APPLE PASCAL Language System and at least one disk drive. The use of a hard copy printer is optional.

And of course, DIRFIX works for files created by APPLE FORTRAN and APPLE PILOT, too.

Price: $35.00 and is available from: SEVEN MILE SYSTEMS, Inc., Quality Software Engineering, 420 East Eighth Street, The Dalles, Oregon 97058, (503) 296-1436.

APPLE SPEAKS INTELLIGENTLY!



The people who dared to teach Atari to talk are again challenging the microcomputer establishment with the **VOICEBOX** Speech Synthesizer for Apple. This low cost intelligent peripheral can speak thousands of words unassisted, generated directly from its firmware ROM dictionary located on its plug-in card. This means that speech, with variable intonation and speed, can be used in any of your apple programs without ever having to bother loading a disk. And, in case you want to expand your dictionary to include unusual words or words in foreign languages, you can easily define them with our 64 phonemes and store them by the thousands on one of the six special dictionaries provided for on our disk.

In addition your **VOICEBOX** for Apple can be easily coded to sing on key with uniform barlengths and you can store (record) your songs on disk, retrieving and modifying sections whenever you want. With the disk system, you'll also enjoy an educational random sentence generator and graphic speech animation! The **VOICEBOX** for Apple will run on 32K Apple II with Applesoft or Apple II Plus systems equipped with sixteen-sector disk drives. **VOICEBOX** for Apple comes with loudspeaker and disk. The Alien Group also makes a less expensive **VOICEBOX** for Apple with all features (including expandable disk dictionary), but excluding firmware ROM and singing capability. Speaker is optional on this unit.

For Atari users, the **VOICEBOX** for 16K and up Atari plugs directly into the serial port. No extra cables are needed and no speaker is needed since the speech comes directly over your TV monitor. This unit has all speech synthesis features except singing and firmware ROM.

AL-3001 **VOICEBOX** for Apple. With firmware ROM, singing capability and speaker $215.00
AL-3501 **VOICEBOX** for Apple. Without firmware ROM, singing capability and speaker $139.00
AL-4001 Speaker for AL-3501 (the AL-3501 will also work with any other speaker) $15.00
AL-5001 **VOICEBOX** for Atari $169.00

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M. Joseph Schaller/Cider Press

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GPLE Review

M. Joseph Schaller/Cider Press

Suppose you have an Apple][. So far, so good, right? Next, suppose you do some programming in BASIC. Still with me? Now, one last thing: suppose somebody offered you a program that would:

- allow you to directly, conveniently, fairly elegantly edit BASIC files (not converted text files, but BASIC itself)
- do this either on your 80-column card or in 40 columns, switching at any time by a single keystroke
- let you customize any key on the keyboard into a "program function key" (each representing any sequence of commands or characters)
- give you an extra 10k or so of usable memory
- cost you under $100? how about $50? how about under $40?

Now you know I'm crazy, right? Read on.

First, a little explanation. Ordinarily reviewers in the *Cider Press* get a free copy of the program they review. I suppose that helps motivate them to put out the effort. In my case, I actually paid hard cash for this program. I am motivated to write this review by one fact: I like this program so much. Now I know we reviewers aren't supposed to get that excited, right? Read on.

That list of ticklers I offered you above is only the beginning. This is the latest revision and a significant enhancement of the Program Line Editor that the Apple PugetSound Program Library Exchange (whew! Say that fast.) first offered in 1979.(These are the same people who publish *Call – A.P.P.L.E.).* I never saw the first version, but this one is incredible for the price. They say this Editor caused quite a stir at the Boston Applefest, and I believe it!

Editing BASIC

The program is named Global Program Line Editor, or GPLE for short. (With a name like that, it's got to be good??) GPLE is a "resident" editor. That is, it is always there, once you boot it up, although it does not appear to change the way your machine otherwise operates. You still have BASIC; you can still instantly RUN the programs you are editing (wonderful!); you can still "hide" programs beneath DOS, and so on. You just have more capabilities in your system than you had before.

We ought to get one thing clear at the outset, though: GPLE is a program editor, it is useless for editing documents, etc., because, since BASIC is still active, normal input is parsed into appropriate BASIC; GPLE is not intended to be and would be useless as a word processor.

But that "inability" is one of GPLE's advantages. I've used three different text editors (even the Pascal editor) to process BASIC files, and it's like opening a can with a blowtorch; a simple tool works much better. Here's the old way: First, I (or the editor) had to translate, by using a capture program, the BASIC program I was working on into a text file that the editor could read. On a long program that took up to five minutes, each way. In the process I lost any ability to use autonumber or to renumber programs while I was editing. When the editor was of the line-number-oriented type, I had to use

—

new numbers other than the BASIC line numbers to access the program. This made it harder to stay in touch with what was happening where. Then when I was done, I had to EXEC the program to get it back into BASIC form, so I could RUN it. The whole process was so cumbersome that I ended up only rarely using any of the editors I had available.

GPLE, on the other hand, is anything but cumbersome. The commands are simple, intelligent one-character mnemonics; and none of its commands conflict with the ordinary BASIC system. The editor loads itself once when you turn your machine on, and although it is invisible in ordinary use (you can go right on using RUN, EXEC, LOAD, even BRUN if your program doesn't overlay the Editor), it is always there when you need it. And then when you start to use it...and no more cursing about that clumsy ESC IJKM stuff!

For example, you can give GPLE a command to:

- Edit line 100
- Edit lines 100 thru 1300, one at a time
- Edit all lines with "Joseph" in them
- Replace "Joseph" with "Mud" in lines 300 thru 4500, plus allow you to edit anything else in those lines

It's almost easier to make it happen than to describe it. That last replacement within a range, for instance, occurs when you type:

Ctrl-E 300,4500,"Joseph","Mud"

The editor then presents you with each changed line, allow you to retype, insert or delete any part of it, and even restore the original line, all with one-character commands. The format for all four of the above commands is the same; you just leave out the unneeded fields. That kind of command consistency is typical.

You can also convert upper to lower case, or vice versa, simply and selectively (and incidentally, execute Applesoft commands you type in lower case!), insert visible control characters (including RETURN), delete characters, delete up to a specified character, delete to the end of the line, tell it to find and edit "the last line I edited", and change your mind and restore the original line. There's more. As far as I can see, GPLE does everything you'd want to do in editing BASIC (except write the code for you).

The editing commands are all easily remembered one-character mnemonics: Ctrl-E for edit, Ctrl-I for insert, Ctrl-D for delete, Ctrl-R for restore original, and so on. Or how about Ctrl-P for listing a page (screen) at a time. No more trying to hit Ctrl-S at just the right point to stop a listing that is "faster than a speeding bullet." The editing functions are great. Intelligently done. Simple enough to learn quickly. Powerful enough to love. But wait... Read on.

Customized ESC sequences

In my rather jaundiced opinion, just the editing functions alone would probably be worth the price. But then we come to the "program function key" capability. Here again is something that might be worth the price by itself. Program function keys are something the Big Boys have. On IBM or Hewlett Packard mainframes that I have worked on there were 6 to 24 or so special keys, usually sitting off to the side, where you had to take your hands off the keyboard to reach them. If you were doing something frequently which took several keystrokes, or even several lines to enter, you could "customize" the keyboard so that hitting some escape-type key and then one of these special function keys would transmit that sequence automatically. You just had to remember what you made each one stand for, by number.

Not only does GPLE provide this handy feature, but it does it better: you can make *any* key (thus mnemonics are possible) stand for *any* sequence, including text, commands to the monitor, BASIC, RUN a program, DOS commands, control characters... you name it. The GPLE comes with 45 or so already configured. But you can change this and add your own (within a limit of about 1200 bytes). And you can save your changes so the machine boots up that way, or have alternate sets that you load in from disk.

So, for instance, GPLE comes set up so that ESC 1 (or 2) will catalog drive 1 (or 2) and tell you how much free space is available; ESC 0 clears (zeroes) the screen; ESC R issues a RUN command; ESC L causes a LIST. But it's the even longer or harder to remember command sequences that are most useful. I set mine so the ESC Ctrl-M tells me how much user memory is still available; for me, ESC P causes "PR#1, Ctrl-I80N, LIST" to be sent to the system (causing selection of the printer, telling it to print in 80 columns, instead of 40, and listing my current program). There are ESC key commands for listing the start address and length of the last binary file loaded, for inputting all the "missing" characters, for translating to decimal the lo-hi contents of any two-byte word, for hiding your program before a merge, entering the monitor, printing how many free sectors are on the last disk catalogued ...A "help" listing of all of them is available at any time by hitting Ctrl-E?. And any of them can be changed by using the same easy Edit command on the ESC sequences. You simply edit the command as you would a BASIC line.

That gives me some great ideas for the future. I can use ESC sequences to put standard responses in when I am testing input to a program or to customize a keyboard for a client user or any place where simpler responses are needed!

What? There's more?

Yes. The package also includes programs to move DOS to the language card, if you have one (which is where the Editor will place itself too). This can be a significant advantage if you are writing or using large programs. Without this feature you, as user, have about 37k of actual space available on a 64k machine. When you have run GPLE's DOS MOVER, you have over 47k. Also included are programs that allow the Editor to reconfigure itself and all its associated programs for five major 80-column cards (I use the ALS Smarterm and it works fine), and programs to fix RENUMBER, FID, and MUFFIN so they will work with the moved DOS if you want. GPLE comes on an unprotected diskette, so there's no problem transferring or copying. The publishers ask you very nicely not to rip them off, and at the price there is certainly no valid excuse for anyone to do so.

Well, what's wrong with it?

You wouldn't believe me if I didn't moan a little, right? Well, the damn thing would not do my laundry or the dishes. Also, I had to do some minor programming to make it automatically boot up for my 80-column card, although GPLE booted itself fine up to that point. This might be a nuisance if you didn't know what you were doing. *Call - A.P.P.L.E.* maintains a hotline for all kinds of questions, not just this product, but I didn't need to call them. The documentation is good, but packed. The slim 36-page manual is nicely organized, provides some very brief tutorials, examples and discussion as well as a list of available commands. The manual also tells you how to customize the ESC sequences. You'll probably like the manual best if you already know something about your Apple because it's slightly rough in spots. But it will suffice for novices too, and GPLE will make programming the Apple so much simpler, especially for a novice!

There is one kicker: if you're not already a member of A.P.P.L.E. you'll have to pay a $25 application fee plus $20 dues to join, but that also gets you the monthly magazine (useful!) and access to their program library. And there are a couple of dozen more products you might consider from them as well. The price of GPLE is $38.50. Personally, I think it's a bargain.

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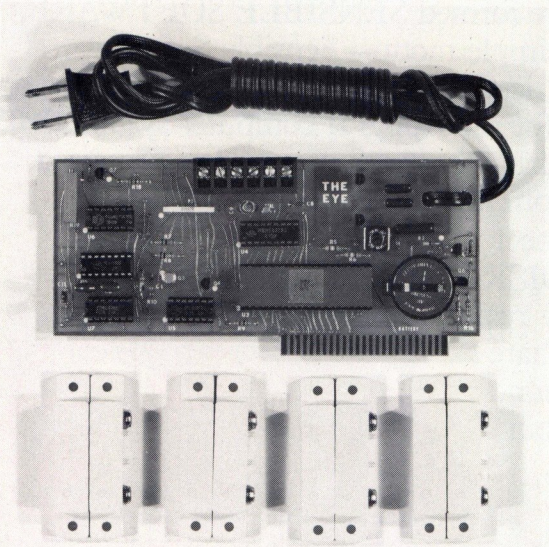

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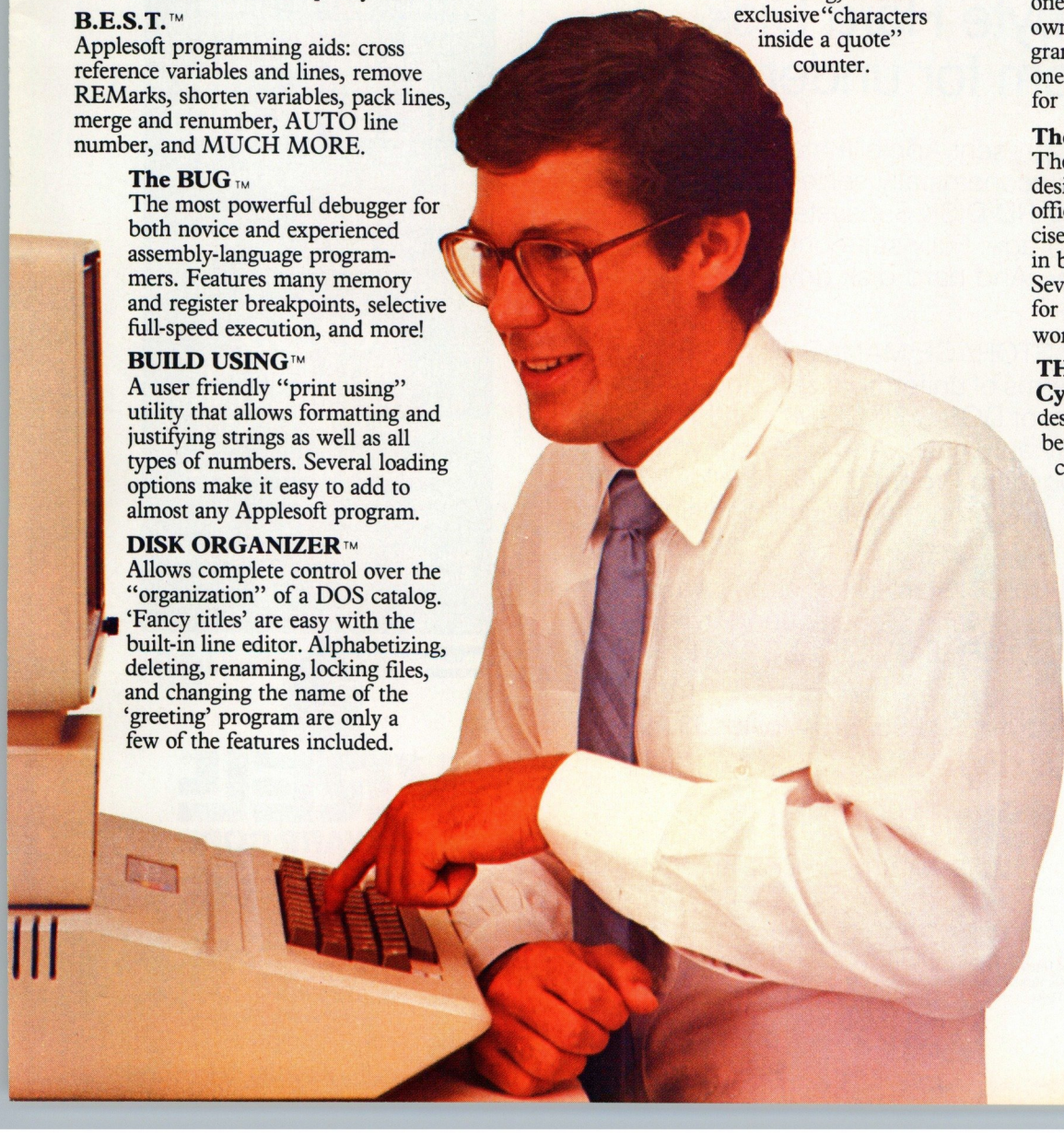

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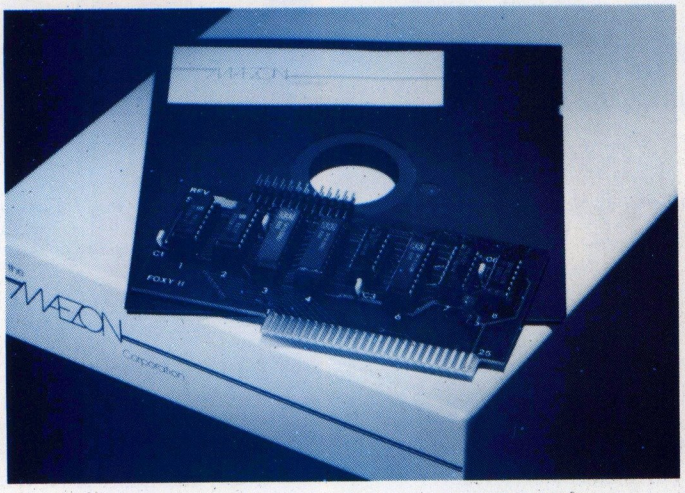

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AD INDEX

A.P.P.L.E. 10, 61, 75, 81, 82
The Alien Group 80
Apple Computer, Inc. ..... IBC
Applefest 11
Appleware, Inc. 76
Ashton-Tate 44, 45
Assembler Teacher 26
Axlon 21
Balbesoftware Systems 53
Beagle Brothers 12
Bit 3 Computer Corp. 43
Burt Microsystems 70
Bytes & Pieces 25
Cases, Inc. 62
Central Point Software 42
Computer Case Co. 76
Computer Exchange 33,34
Connecticut Information Systems 28
Cortland Data Systems 62
Datamost, Inc. 1
Dickens Data Systems 16
Educational Computing Systems 42
Expotek Corporation 64
Futra Company 54
Hayden Book Company, Inc. 6, 48
Hayes Microcomputer Products 8
High Order Micro Electronics 69
Interface, Inc. 60
Krell Software Corp. 86
Lama Publications 66
Leading Edge Products ..... IFC, BC
Lehigh Valley Computer Corp. 83
Maezon Corporation 86
Micro Control Systems 35
Micromax 61
Microware Distributing 70
Omega Microware, Inc. 5, 41, 60, 76
Pion, Inc. 66
Qcom 72
R.H. Electronics 65
Sensible Software 84, 85
S & H Software 56
Soft Key Publishing 66
Software Etcetera 70
Southeastern Software 22
Southwestern Data Systems 56, 65
SRA 27
Stellation Two 62
Sympathetic Software 43
Synergetic Solutions 66
Telephone Software Connection 65
Vista Computer Compnay, Inc. 4
XPS, Inc. 36

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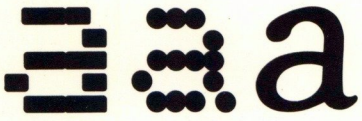

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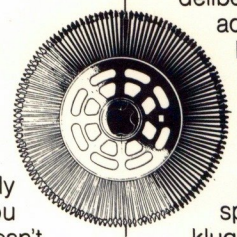

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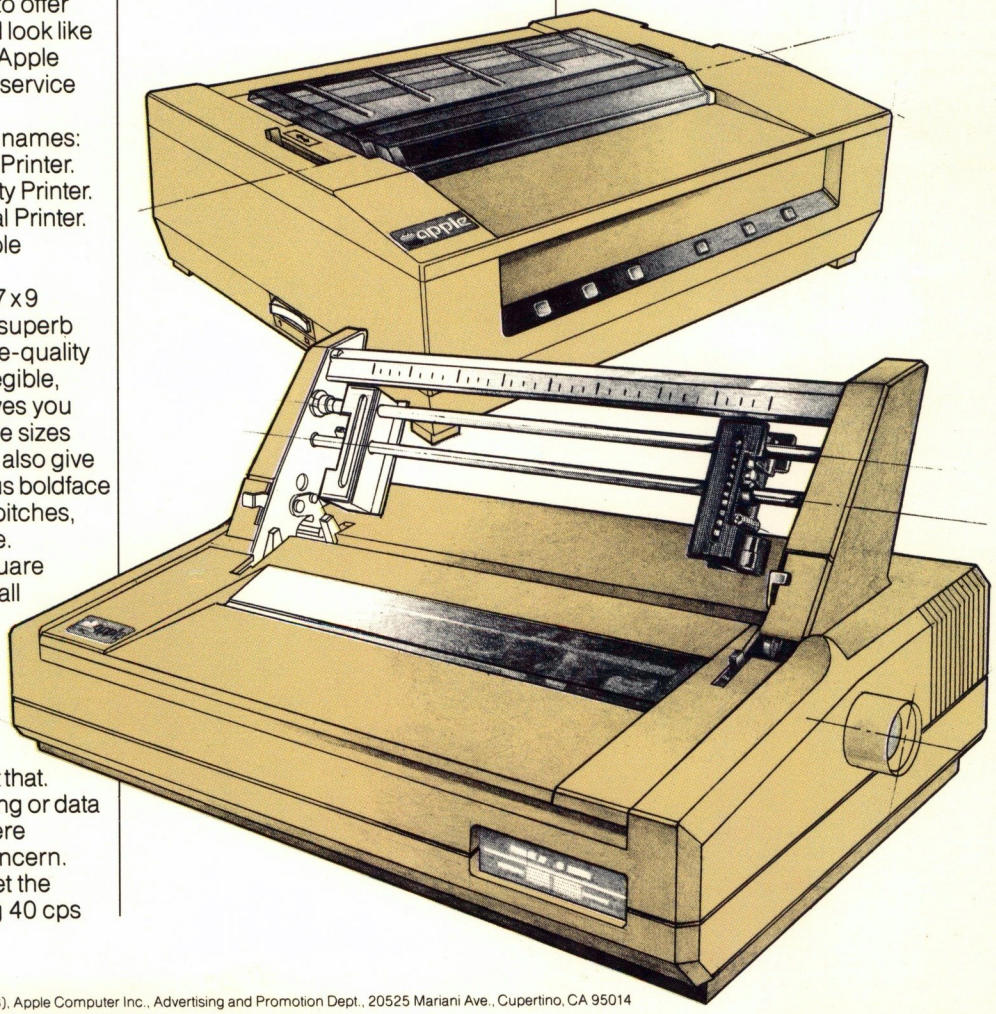

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